

# SMART METER HEALTH CONCERNS: JUST A NOCEBO EFFECT OR AN EMERGING PUBLIC HEALTH NIGHTMARE?

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## THE CASE FOR SMART METERS

As an essential part of its energy policy, in 2007 the Council of Australian Governments (COAG) in the *National Reform Agenda* recommended the gradual replacement of analogue electricity meters with smart meters which have built-in wireless interconnectivity with a new smart electricity grid. The aim was to give both the electricity provider and the home/building owner more control over energy consumption. This was scheduled to begin in 2009 but as of 2012 only NSW and Victoria have committed themselves to the roll-out<sup>1</sup>.

There are a number of reasons for the mandatory introduction of smart meter technology in Australia, the primary one being the empowerment of customers to be able to reduce unnecessary energy usage by providing accurate real-time information about their electricity consumption. This is achieved through additional devices such as in-home displays and web portals, with data wirelessly sent back to the electricity suppliers via the smart meter.

Eventually, millions of existing home appliances will be replaced with new energy efficient smart home appliances, giving the consumer access to these appliances even when away via the Web on their smart phones. One example is LG's new smart fridge with a 'food management

system' that tells you what's in your fridge, expiration dates, what to buy, cook and eat through your smart phone<sup>2</sup>. Then there is LG's robotic vacuum cleaner, with a built in security camera that can be controlled wirelessly through the smart phone<sup>3</sup>.

## THE CONTROVERSY IN VICTORIA

On 17 May 2012, Energy Safe Victoria (ESV), released a draft report on the safety of smart meters. Titled *Safety of Advanced Metering Infrastructure in Victoria*<sup>4</sup>, the report was written in response to increasing public concerns over a number of issues with the compulsory roll-out of smart meters. Although the report stated that the emphasis was on safety, the issue of possible health effects received little mention, simply stating that the subject was "beyond the detailed scope" of the report. As for the "potential health effects of smart meters" the report said that this was the subject of separate regulatory arrangements administered by the Australian Communications & Media Authority (ACMA) incorporating the exposure limits developed by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)<sup>5</sup>.

What was not mentioned however is that the ARPANSA standards are only for protection against immediate thermal hazards (tissue heating) at high intensity

exposures and not against cumulative biological-effects from low intensity exposures<sup>6</sup>. Therefore it is incorrect to suggest that they are sufficiently protective of public health especially as there are increasing reports of residents developing health problems subsequent to having a smart meter installed on their home, especially when the meter is located externally on a bedroom wall. Symptoms include: insomnia and tinnitus; stress; agitation; irritability; difficulty concentrating; heart problems; fatigue; headaches; pressure in the head; weakness; visual problems; nausea; flu-like symptoms; skin rashes; high blood pressure; changes in the menstrual cycle; and changes in children's behavior<sup>7</sup>.

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These reports are not unique to Victoria but are being reported in the U.S.<sup>8,9</sup>, and Canada<sup>10</sup> where a smart meter rollout has been underway for some time. In Europe, however, it's still too early to tell if these problems will emerge<sup>11</sup>.

Despite a number of public submissions to ESV addressing the health effects issue, including one by this author, in the final ESV smart meter report of 31 July 2012, the conclusion was simply that "smart meters are safe" with any mention of health and radiation emissions deleted in the final document. For instance, the draft Section 3.6 titled 'Do smart meters emit radiation or other toxic or harmful chemicals?' was changed to 'Do smart meters emit toxic or harmful chemicals?' with the issue of radiation emissions simply deleted as if it no longer applied<sup>12</sup>.

Currently there is practically no research on possible ill health effects of exposure to smart meter radiofrequency (RF) emissions. However, a U.S. survey of 318 people who had a smart meter installed on or close to the home showed that a significant number reported subsequent health problems: 49% insomnia; 43% stress; 40% headaches; 38% ringing in the ears; and 26% heart problems<sup>13,14</sup>. In many cases symptoms were more pronounced when the smart meter was adjacent to a bedroom. It has also been reported that California's Investor Owned Utilities (IOUs) has quietly begun replacing Smart

Meters with analog meters for citizens reporting adverse health effects<sup>15</sup>. In addition, the highest court the U.S. state of Maine has ruled that state regulators failed to adequately address health concerns in the roll out of smart meters in the state<sup>16</sup>. This can also be claimed for Victoria.

Many of the health complaints from Victoria are from people who now have a smart meter near their bedroom. For example:

*Since installation I wake up with headaches every single morning and go to bed with something very much like Vertigo every night. I have had this ever since the Smart meter was installed. It is also installed on my front porch, which is right outside my bedroom so I am very close to it<sup>17</sup>.*

*My symptoms started the night the smart meter was installed. Waking with heart palpitations and a racing heart and internal shakiness. A surging feeling that went right through my body now and then. Head pain and a burning pain on the left side of the head. Depleted immune system-leading to flu and cold. I am now getting nausea and maybe 2 -3 hours sleep a night<sup>18</sup>.*

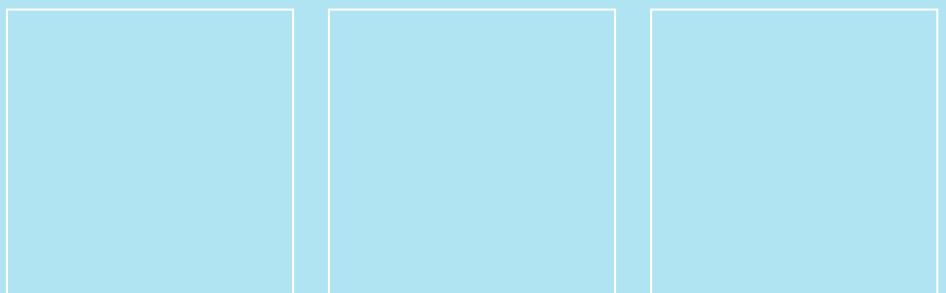
What are we to make of these anecdotal reports? Are they the result of a real biological effect from smart meter emissions, or, as has been suggested by some, just 'smart meter hysteria'<sup>19</sup> caused by exposure to scare stories in the media, and on the Web. As this is now being

claimed to be the situation by those promoting smart meter technology, it needs to be given consideration.

### A NOCEBO EFFECT?

A January 2012 Montreal newspaper article on the roll-out of smart meters by Hydro-Quebec attributed the mounting public opposition to their introduction to an 'unjustified panic' that was being 'carefully cultivated' by environmentalists<sup>20</sup>. The implication was that if adverse health effects became widely reported it would be because of what people had heard and as a result had worried themselves sick. This is known as the nocebo effect and has been suggested by Professor Andrew Wood from the Brain and Psychological Sciences Research Centre at Swinburne University of Technology. In his report on smart meters, he suggests that the nocebo effect may play a role in symptoms being reported<sup>21</sup>.

There are two reasons for a dismissive attitude to the possibility of adverse health effects from smart meter RF emissions. The first is a reliance on the advice of official standard setting bodies and the second is based on the findings of provocation studies on people who have identified themselves as being sensitive to RF. This condition is called electromagnetic hypersensitivity (EHS).



## INADEQUATE STANDARDS

The prime reason why possible adverse health effects are dismissed is on the advice of standard setting bodies, primarily the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which ARPANSA follows. This advice states that the primary adverse effect of RF exposure is tissue heating from brief high intensity exposures and that other reported chronic effects not related to heating have not been established and therefore cannot be taken into consideration in setting exposure limits<sup>22</sup>. However, ICNIRP has been shown to have significant conflicts of interests that have limited an objective assessment of the science to the point that they appear to be primarily concerned with setting exposure limits as to facilitate technological development. This is achieved by marginalising scientific perspectives that question the thermal effects only paradigm<sup>23</sup>.

As for those marginalised scientific perspectives - there is a substantial body of research that shows that the existing ICNIRP based RF standards (including ARPANSA's) are inadequate for public health protection because of their denial of the scientific evidence of adverse biological outcomes at levels far below the official standard 'safe' limits<sup>24,25,26</sup>.

## PROVOCATION STUDIES

The second reason for dismissing possible smart meter health effects from RF exposure has been the reliance on the findings of provocation studies to evaluate the reality of electromagnetic hypersensitivity (EHS). This type of study simply consists of exposing subjects who have identified themselves as electrosensitive to electromagnetic radiation (EMR) to see if they can feel when the field is turned on or off. These tests have generally found that the subjects failed to distinguish whether the field was present or not - leading to a conclusion by the researchers that the fields were not the cause of their reported symptoms and therefore the problem may be psychosomatic.

Central to EMR provocation studies is the hypothesis that if a person is sensitive to EMR they should be able to feel when the exposure is taking place. If not, it must then be a psychological problem. For example, Rubin and colleagues from Kings College, London reviewed over 40 provocation studies on EHS volunteers and concluded that, overall, people with EHS did not react to EMR exposure any differently from the way subjects react to a sham exposure. Thus, the authors suggested that EMR was not the cause of their condition<sup>27</sup>.

A significant weakness of provocation studies when applied to possible adverse health effects of EMR exposure, however, is that by their very design, they limit the definition of electrosensitive persons to those who claim that they can feel when they are being exposed. This definition excludes the possibility that there may be people who are adversely being affected by EMR exposure but cannot feel when they are being exposed. Such an assumption would quickly be rejected if it were applied to ionizing radiation. This is not to invalidate the claim that some people can feel when they are exposed to EMR but that topic is outside the scope of this paper.



## BAD INFORMATION

In an information sheet being distributed by CitiPower in Melbourne it is claimed that smart meters only send out a radio message every six hours with an implication that they are 'quiet' at other times<sup>28</sup>. This claim, however, does not match with actual smart meter RF emission measurements taken by concerned residents in Melbourne. In a submission by this author to Energy Safe Victoria a number of situations were mentioned where smart meters were frequently sending out bursts of RF energy over 30 times per minute<sup>29</sup>. The timing of these emissions vary widely; for example, over the space of about every two minutes a newly installed meter in Bendigo was sending out a number of RF transient emissions with the peak power density reading being slightly over 67mW/m<sup>2</sup><sup>30</sup>. When not sending the level was .004mW/m<sup>2</sup> (ambient). In another home, a number of transient power density readings of 727 mW/m<sup>2</sup> to 1827 mW/m<sup>2</sup> were measured on a bedhead next to the wall where a smart meter was installed. The couple found sleep impossible after the meter was installed. The point here is not power density levels measured<sup>31</sup>, but that these particular smart meters are far more active than what CitiPower would have Victorians believe. According to data on smart meters as used in California, the main data transmission back to the power supplier happens 2 to 3 times a day but at other times the smart meter is emitting 'self monitoring bursts' between 2 and 5 times a minute<sup>32</sup>. Another possibility is the smart meter's Switching-Mode Power Supply (SMPS) that, at least for ones used in California, have been found to emit sharp spikes of millisecond bursts constantly, 24/7<sup>33</sup>.

If some people are having trouble sleeping close to a smart meter it may be that prolonged night-time exposure to brief but frequent smart meter RF emissions have a characteristic that are disturbing their sleep. Research shows that factors such as duration of exposure may be as just important as power density in causing non-thermal biological effects<sup>34</sup>.

## DISMISSING THE NOCEBO CLAIM

Central to the nocebo claim with EMF exposure is the proposition that without a conscious pre-existing worry there would be no symptoms at all – it's all in the mind.

In conducting population based research the effects of both the placebo and nocebo effect are important considerations. For this reason, in an Australian CFS/EMF exposure study (Maisch, et

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al, 2002) that examined residential exposures to mains power magnetic fields in a group of chronic fatigue patients<sup>35</sup>, a decision was made at the onset not to include subjects who had any pre-conceptions that their illness may be caused by electromagnetic field exposure. In other words, none of the participants were worried about EMF, thus ruling out a placebo effect as far as possible. What we found was that reducing 'excessive' night time ELF magnetic fields significantly improved fatigue symptoms and quality of sleep<sup>36</sup>. Interestingly, one of the symptoms reported, tinnitus, especially at night, disappeared after removal of the source of exposure.

The absence of any placebo effect was also seen in a Workcare Compensation case that took place in Melbourne Victoria in 1991-1992. In this case a number of women who had worked in an office directly over an electrical substation all had remarkably similar symptoms that ceased when they no longer worked in the area. None of the women had any idea that there were high power-frequency magnetic fields in the office. Common symptoms were: chronic tiredness/fatigue; insomnia; stress; prone to virus infections; an inability to concentrate; depression; facial rashes; headaches. One woman summed it up as "a permanent severe case of jet lag"<sup>37</sup>.

The absence of a placebo effect was also seen in a study of population effects of a short-wave RF transmitter facility at Schwarzenburg, near Berne, Switzerland (Altpeter, et al, 1995). Because of persistent health complaints in the population near the transmitters a study was conducted in the early 1990s. Their findings were "highly suggestive of a direct effect of the radio shortwave transmitter on sleep quality" (disturbances in falling asleep and maintaining sleep). Other effects found were restlessness; joint pain; disturbances in concentration; general weakness and tiredness. Sleep disturbance was associated with a maximum exposure of 18.5mW/m<sup>2</sup> with a mean nocturnal exposure of less than 7.0 mW/m<sup>2</sup><sup>38</sup>.

The researchers specifically looked for a placebo effect which they called "health-worrying personality" but found no evidence of it. This was highlighted when the transmitter was turned off unexpectedly, and unknown to the residents, in the middle of the study. Affected sleep patterns recovered until the transmitter was turned on again, when they deteriorated again<sup>39</sup>.

As for the prevalence of electrosensitivity, the American Academy of Environmental Medicine have released a statement that recognises that patients are being adversely impacted by EMF (power frequency) and RF fields and are becoming more electromagnetically sensitive. The AAEM recommends that physicians consider patients' total electromagnetic exposure in their diagnosis and treatment, as well as recognition that EMF and RF fields exposure may be an underlying cause of a patient's disease process<sup>40</sup>.

## A RESEARCH PROPOSAL

From a public health perspective, the suggestive evidence that smart meter RF emissions may be having an adverse health impact calls for an urgent research effort. Even if the number of affected people is small, the sheer number of people exposed represents a potential significant public health risk. To simply dismiss this possibility as just a placebo effect without a serious research effort is inexcusable.

One way to proceed with this research is to take the 'worst case scenario' – when a bedhead is next to a smart meter on the outside of the wall and design a study to determine if smart meter emissions affect sleep patterns. This should be done as a double blind study, through an independent sleepcentre<sup>41</sup>. Set up a sleeping room with a functioning smart meter close to the bedhead on the other side of the wall so it is not seen by the participants. As it might be difficult to set up an operating smart meter in a laboratory situation, it may be easier to use an existing residence with a bed placed by an existing smart meter that has been modified to be able to be switched on and off at random times. Smart meter emissions would be confidentially recorded throughout the study using suitable equipment to determine if there is a correlation between sleep patterns and emissions.

Ask for healthy volunteers (equal numbers of males and females) to spend a few nights sleeping in the room, while collecting EEG (electroencephalogram) data to gauge sleep and brain wave patterns, etc. The meter would be switched on and off for some of the volunteers but neither the volunteers nor the people overseeing the experiment will know whether or not the smart meter is active or not. A questionnaire would also be used to assess subjective feelings, such as depression, stress, anxiety levels, and tinnitus, for example.

A second part of the study would be to also call for volunteers who claim to be adversely affected by smart meter emissions to see if their symptoms correlate with the times the meter is emitting. A provocation study could be included here to see if these subjects could sense whether or not the meter was active while awake. Most important, an unblinded and independent oversight committee would be created and would include members from concerned trade unions, public interest groups and the medical fraternity. This would be to ensure that the eventual findings have been obtained without vested interest influence.

If at the end of the first part of the study the volunteers show no differences in sleep patterns, even when sleeping next to an active smart meter that would go a long way internationally to assure the public that smart meters are safe.

If on the other hand, clear differences in sleep patterns are seen, that would call for a reevaluation of the present type of wireless smart meter being used and positioning in relation to bedroom areas.



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