

# The Smart Electricity Grid Claims, Pitfalls, and Unintended Consequences

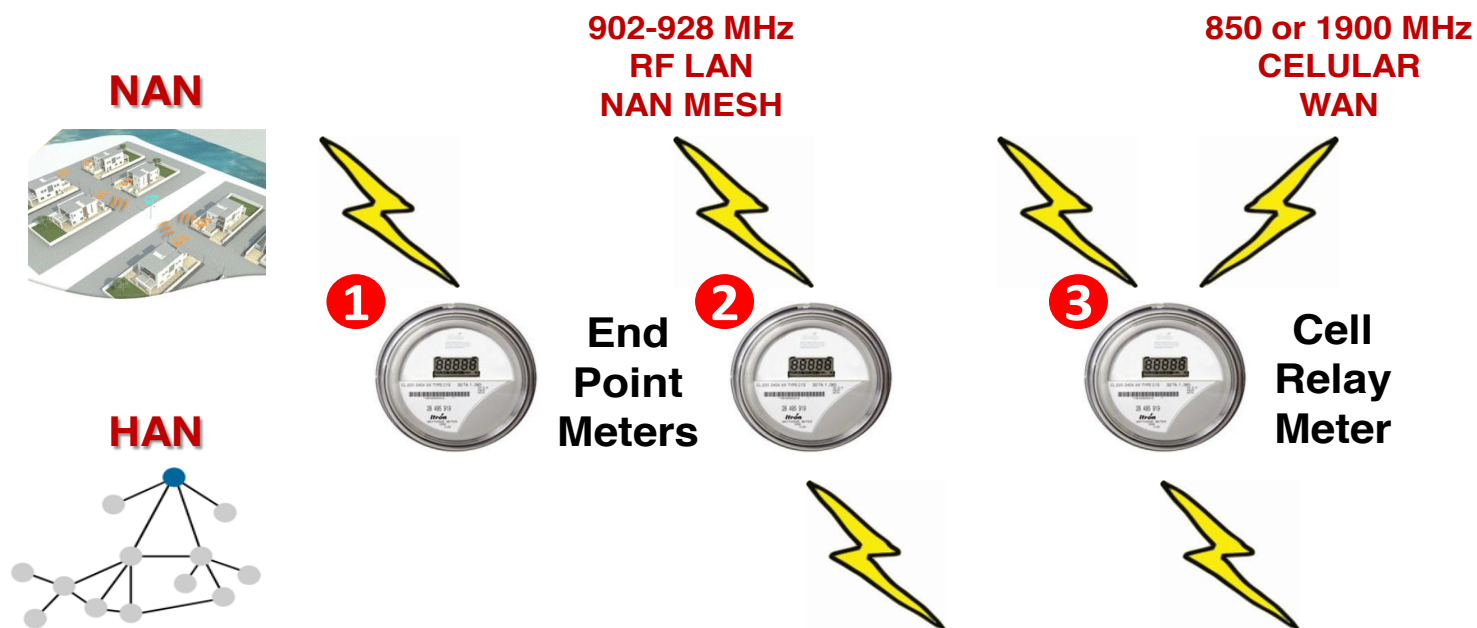
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# What is a smart grid?

- An electricity supply system that uses a wireless communication system to allow remote reading of electricity consumption and remote control of electrical equipment.
- The “heart” of the smart grid is the smart meter that contains two radio transmitters, one to communicate externally with the utility grid and one to communicate internally to communicate with Wi-Fi-enabled smart appliances.

# SMART METERS

## TRANSMITTER OPTIONS



- ✓ Three Smart Meter Smart Transmitter Options:
  1. **NAN** Only End Point
  2. **NAN** + **HAN** End Point
  3. **NAN** + **WAN** + **HAN** Cell Relay
- ✓ Up to two Transmitters can Simultaneously Transmit
- ✓ Total Exposure =  $\Sigma$  Transmitters = **NAN** + **WAN** + **HAN**

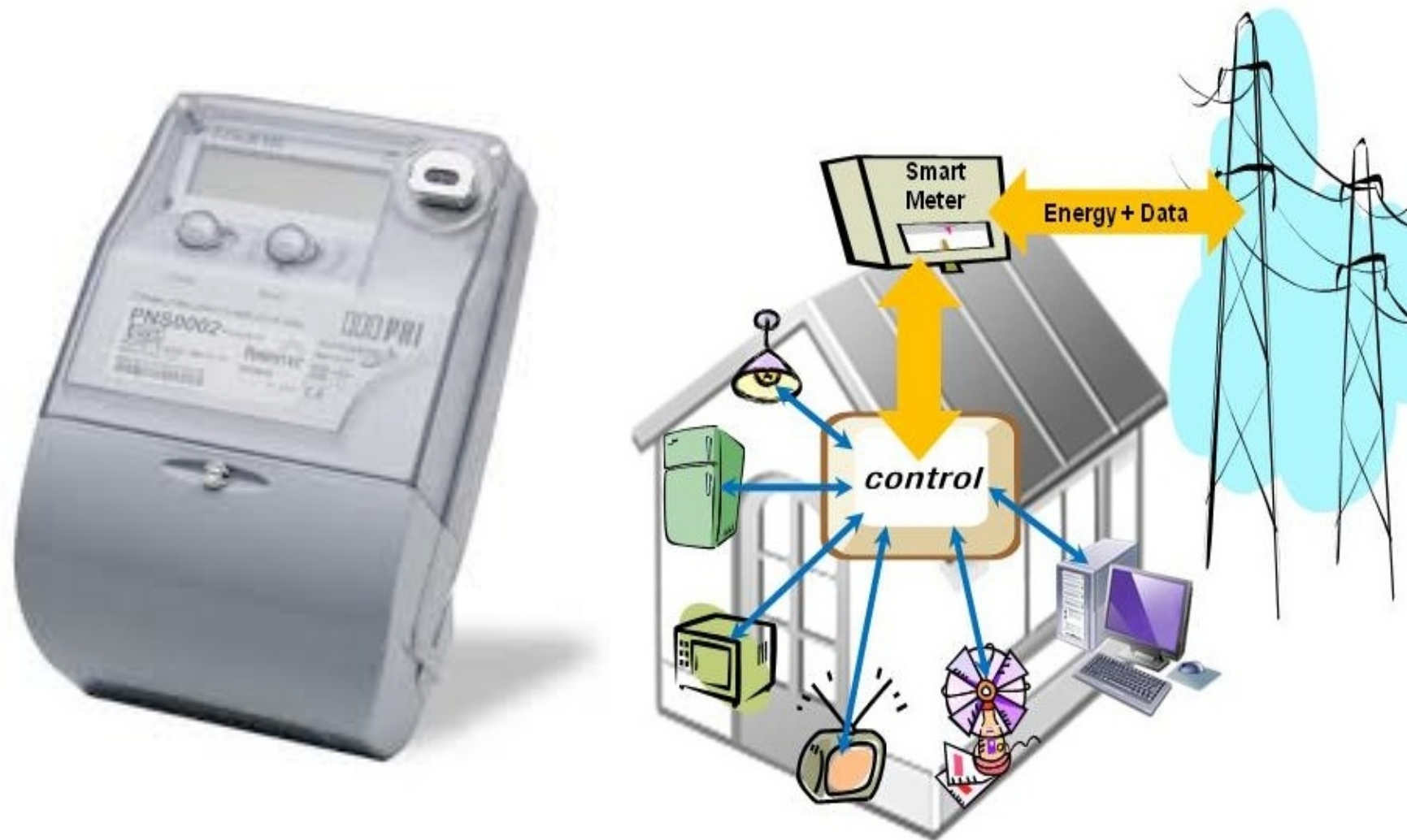
**HAN** HOME AREA NETWORK  
**NAN** NEIGHBORHOOD AREA NETWORK  
**WAN** WIDE AREA NETWORK

# The sales pitch

- Promoted to the public as a way to “empower” individual energy consumers by allowing them to access information via a wireless network on their energy usage so that they may eventually save money by programming “smart” (i.e., wireless-enabled) home appliances to coordinate with the smart meter to run when electrical rates are lowest.
- Central to the smart grid is a tiered pricing system (time of day) for electricity consumption that will be set by the utility.

# Smart grid claims

- “Demand-side participation” (DSP) creates a lower demand for energy and lower costs to the consumer, thereby lowering fossil fuel burning = lower greenhouse gas emissions.
- Increases reliability and security of supply.
- Reduces the incidence of peak price events.
- A “low-emission” technology.



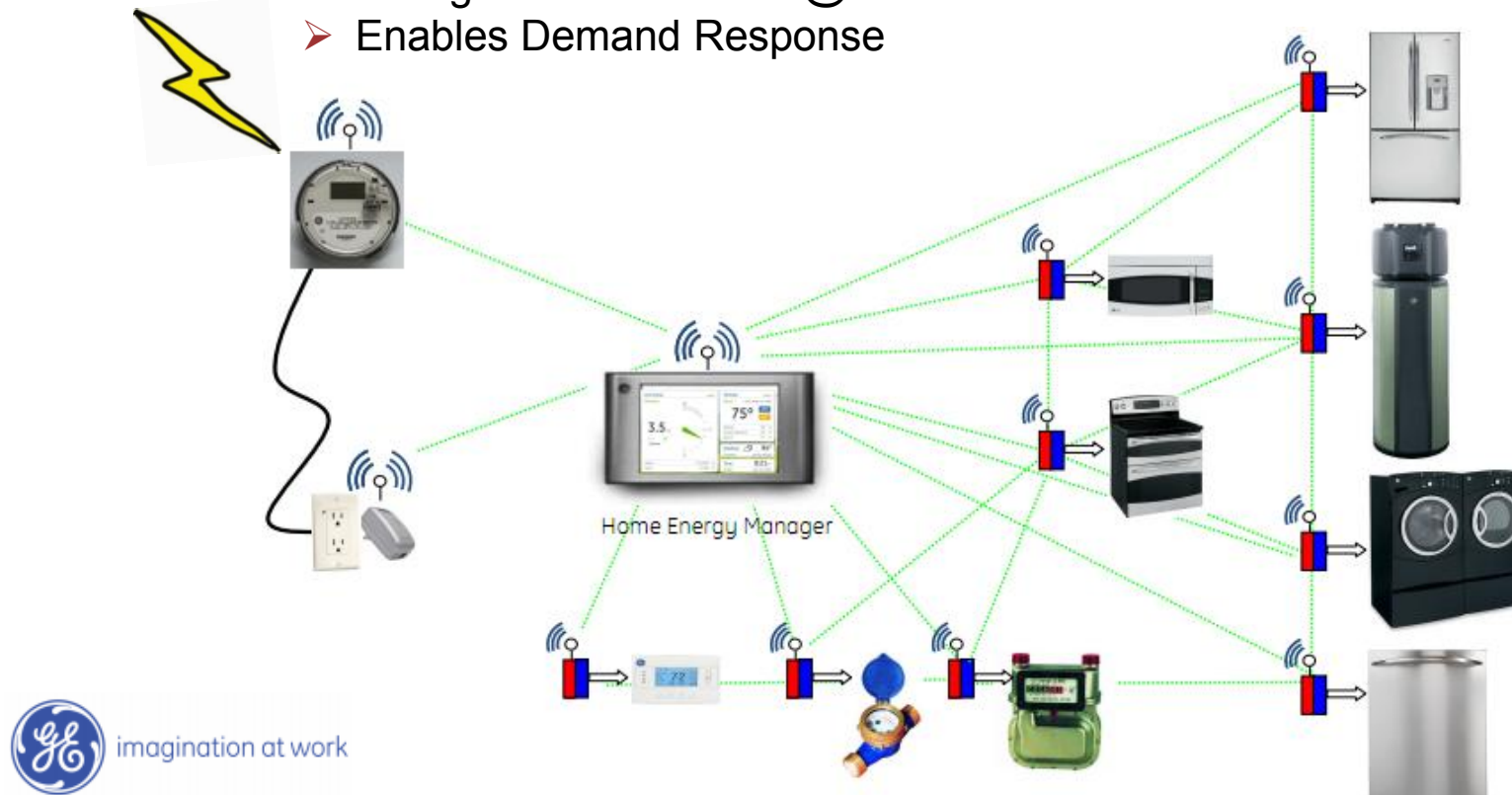
Source: <http://www.uspurtek.com/?p=230>

# SMART GRID ARCHITECTURE

## HOME AREA NETWORK (HAN)

- GE Home-to-Grid Demand Response Solution
- 12 Zigbee Transmitters @ 60 mW each
- Enables Demand Response

NAN



**SOURCE:** GE Demand Response Enabled Appliances/Home Energy Management System

# GE's Home Management System

## Featuring Nucleus and Brillion Technology

“Nucleus home manager with GE Brillion technology brings the promise of the smart grid into your home. The GE Nucleus – when used with a smart meter – provides a wireless home energy monitor that simply plugs into any standard electrical socket. Once installed, Nucleus home manager communicates with the smart meter to collect and store data...”

Ref: <http://www.geappliances.com/home-energy-manager/>



Ref: <http://www.norad4u.com>

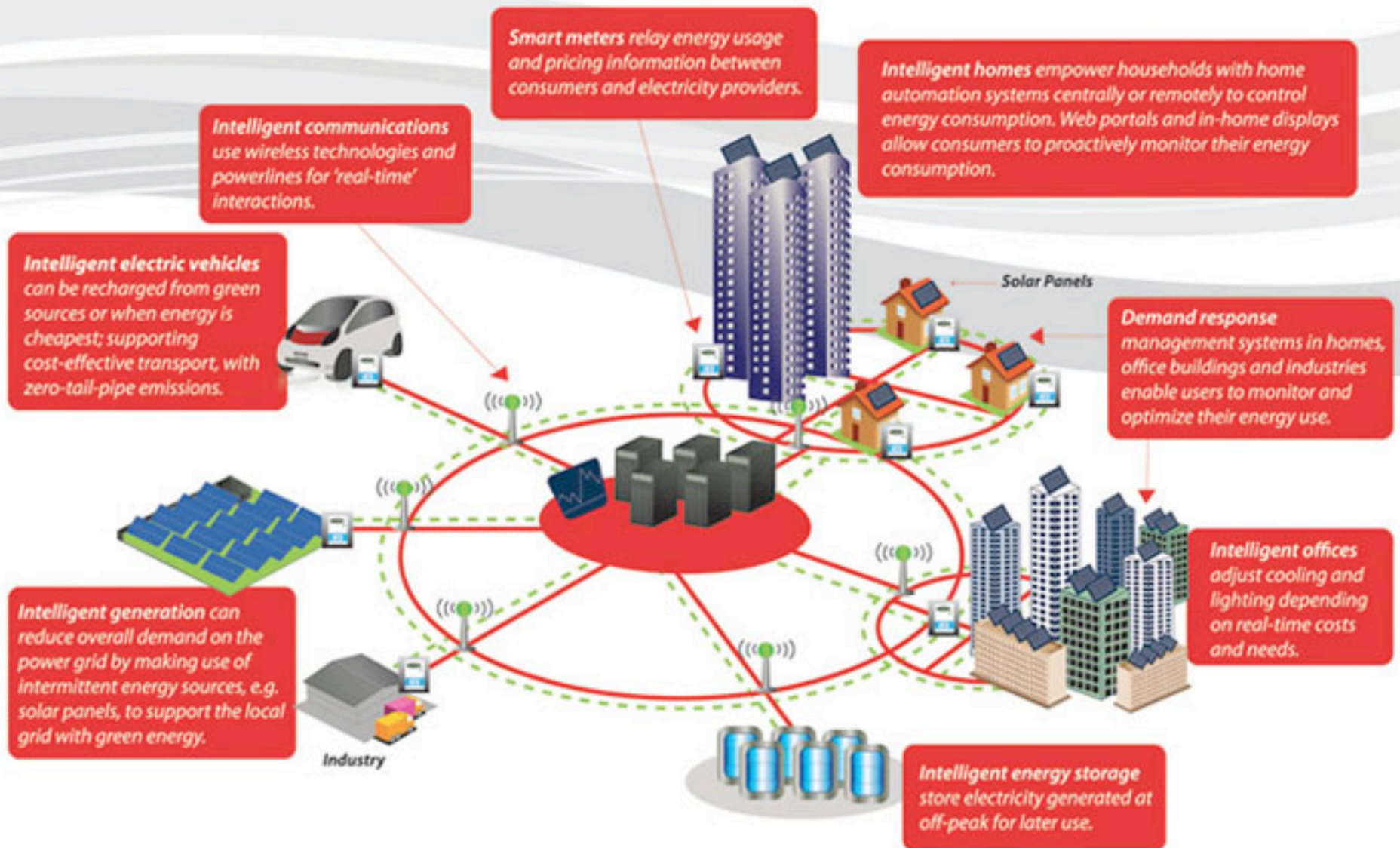
# Smart Grid Australia

- Allows utilities to manage and monitor customers' home appliances in order to save money by reducing their energy consumption.
- "IBM and Shell have called for 'Smart Cities' that make more efficient use of technology and increasingly scarce resources such as energy."

Ref: Smart Grid Australia: [http://www.pams.com.au/DEMO/StaticContent/Images/SGA/130521\\_GenSGA\\_eFlash.htm](http://www.pams.com.au/DEMO/StaticContent/Images/SGA/130521_GenSGA_eFlash.htm)

## The Intelligent Energy System (IES) Pilot Project Conceptual Overview

An energy ecosystem connecting intelligent homes, vehicles, communities, electricity network sensors and sources of green generation to promote reliability, sustainability and energy efficiency.



# Smart Grid Australia

- “Appliance manufacturers LG and Samsung have launched Wi-Fi-enabled appliances, and most major manufacturers are launching new connected products in 2013, which will continue to increase consumer awareness and strengthen the value proposition of connected appliances. They are now expanding the capabilities of smart appliances beyond energy management to include new features that enhance control and convenience.”

Ref: [http://www.pams.com.au/DEMO/StaticContent/Images/SGA/130521\\_GenSGA\\_eFlash.htm](http://www.pams.com.au/DEMO/StaticContent/Images/SGA/130521_GenSGA_eFlash.htm)

## But who will pay for it?

- “...ultimately customers will pay for the smart network. For this reason, it is vital that a...smart network is rolled out in a staged way where there is a strong prospect that the benefits will exceed the additional costs within a reasonable time period.”

Ref: *Electricity Smart Networks*, Nov. 2012

- Between 2009 and 2015, Victoria's electricity distributors are to spend \$2 billion on the meters, recovering the costs through user charges.

Ref: Smart meter charges 'too big', *The Age*, Feb. 12, 2013

# Tiered pricing – or price gouging?

- “Smart meters here are essentially time-of-day-meters: they promise savings with reduced tariffs, the catch being these savings only benefit insomniacs, and are more than eroded by a gouging tariff at the times the normal of our species may actually want to cook, wash or watch TV.”

Ref: <http://www.eevblog.com/forum/chat/anyone-know-how-domestic-electricity-meters-handle-reactive-loads/>

- Tiered pricing creates a strong incentive to purchase smart appliances in order to be able to “participate”.

# The Victorian smart meter debacle

- The current smart meter roll-out in Victoria was originally costed at \$800 million but has blown out to cost the government approx. \$2.3 billion.
- More than \$1 billion has been wiped from the net benefit forecast for Australia's first mandated electricity smart meter roll-out.

Ref: *The Australian*, Smart meters fuel blowout cost fears, Dec. 15, 2011,  
<http://www.theaustralian.com.au/national-affairs/state-politics/smart-meters-fuel-blowout-cost-fears/story-e6frgczx-1226222383024>

# The Victorian smart meter debacle

- “A consumer revolt is also threatening to fuel cost blowouts as tens of thousands of Victorians reject the electricity monitoring systems being imposed statewide.”

Ref: *The Australian*, ibid.

- Significant opposition primarily because of reported health effects after a smart meter was installed.

Ref: <http://stopsmartmeters.com.au/health-researchsafety/>

# Foreign ownership of Victoria's energy assets

- The Hong Kong-based Cheung Kong group owns 51% of **Citipower** and **Powercor** in Victoria.

Ref: [http://www.powercor.com.au/Corporate\\_Information/](http://www.powercor.com.au/Corporate_Information/)

- **Jemina** is 100% owned by Singapore Power.

Ref: <http://jemina.com.au/assets/about/Corporate%20Profile.pdf>

- **Jemina** owns 34% of **United Energy**.

Ref: <http://www.jemina.com.au/what-we-do/assets/united-energy/>

# Foreign ownership

- The rest of **United Energy** is owned by the DUET Group jointly managed by AMP Capital Investors Ltd and Macquarie Funds Group.

Ref: <http://www.duet.net.au/>

- **SP AusNet** is 51% owned by Singapore Power.

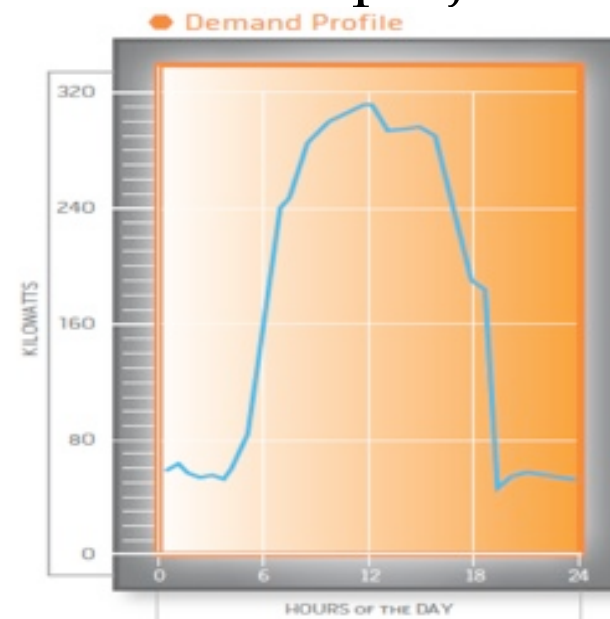
Ref: <http://www.ausnet.com.au/CA2575630006F222/Lookup/ASX2012/4file/BusinessReview%202012%20ASX.pdf>

# For the industry it's all about peak demand

- One of the primary goals of the Smart Grid is to help flatten peak loads and smooth out demand in order to avoid rolling brownouts/blackouts from projected future increases in demand.

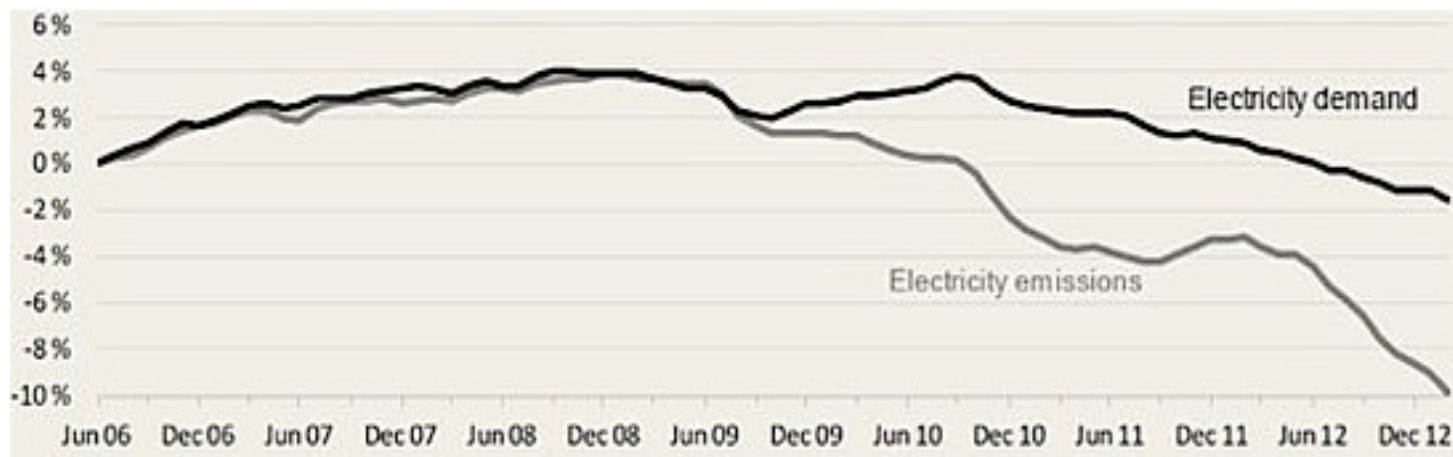
Ref:

<http://www.grid2home.com/sg-market.html>



# Peak demand was a costly problem

- Over the past four years, electricity demand has been shrinking:



Ref: Pitt and Sherry CEDEX index

<http://www.businessspectator.com.au/print/471186>

# Australian Energy Market Commission

- Report: *Power of choice – giving consumers options in the way they use electricity*, March 2012.
- Blueprint for smart grid deployment in Australia.
- “The purpose of this review is to identify opportunities for consumers... Consumers require information, education, incentives and technology to make efficient choices.”
- Key terms: demand-side participation (DSP); enabling consumers; DSP opportunities; benefits DSP provides; metering is an important enabler in supporting DSP, etc.

# Australian Energy Market Commission (AEMC)

- Definition of a “vulnerable consumer” in the *Power of Choice* review is a consumer who cannot take advantage of the changing pricing structures for their energy usage.
- “This may be because they are in a situation which requires them to consume electricity during times which are the most expensive.”
- Nowhere in the 227-page review is mention made of possible consumer health effects.

Ref: <http://www.aemc.gov.au/panels-and-committees/consumer-advocacy-panel.html>

## AEMC's deceptive assurance

- “The most notable of the smart metering-related changes in the *Power of Choice* review is that the deployment of smart meters is likely to become market-driven. **This would mean that a residential customer would only receive a smart meter if that customer explicitly requests a smart meter.**”

Ref: Letter from Bryan Green, Deputy Premier and Minister for Energy Policy, Tasmania, 24 May 2013

# However, read the exceptions!

- “The rules provide that more advanced technology be used and installed in defined situations (i.e., new connections, refurbishments and replacements). These would also be as per the SCER minimum functionality specification for smart meters.”

Ref: The *Power of Choice* review

<http://www.aemc.gov.au/Media/docs/EPR-0022-Power-of-choice-review---Directions-Paper-FINAL-for-publication-pdf-92ab8df4-d019-4e39-9d77-c0fb0c7407de-3.PDF>



# The Internet of Things: Corporate directed social engineering

“The Internet of Things (IoT) is a vision. It is being built today. The stakeholders are known, the debate has yet to start. In hundreds of years our real needs have not changed. We want to be loved, feel safe, have fun, be relevant in work and friendship, be able to support our families and somehow play a role - however small - in the larger scheme of things. **So what will really happen when things, homes and cities become smart?**”

Ref: <http://www.theinternetofthings.eu/>

# SMART GRID OVERVIEW

## SMART GRID INDUSTRY ECO-SYSTEM



SOURCE: Andres Carvallo, The Advanced Smart Grid

# Immersive technology...

- Telstra's chief technology officer, Dr. Hugh Bradlow sees the world by 2020 as one of "immersive technology" where every device in the home, office, cars and wider environment can speak to each other. People will be living in a digital economy with **"sensors that drive smart bodies, smart homes, smart transport and smart environment"**.
- Ref: Smart people well connected, *The Mercury*, March 30, 2013

# Immersive technology...

Bradlow, sees a smart future where all our varied devices will be able to talk to each other **and help direct our lives.**

For example, a Wi-Fi-enabled garbage bin will be able to keep track of what you throw out and send you a replacement shopping list on your smart phone!

Ref: <http://www.emfacts.com/2013/04/telstra-chiefs-wish-list-for-a-future-where-even-the-garbage-bins-are-smart/>

# The Internet of Things

- “Smart grid technologies, driven by two-way communications, will enable a new class of consumer devices and markets in much the same way as the Internet has enabled everything from online shopping to smart phones.”

Ref: <http://www.grid2home.com/sg-market.html>

# A wonderful new world of gadgets

- “Appliance manufacturers LG and Samsung have launched Wi-Fi-enabled appliances, and most major manufacturers are launching new connected products in 2013 which will continue to increase consumer awareness and strengthen the value proposition of connected appliances. They are now expanding the capabilities of smart appliances beyond energy management to include new features that enhance control and convenience.”

Ref: <http://www.grid2home.com/sg-market.html>

# A wonderful new world of gadgets

- “The next appliance to go in your kitchen or laundry room may not get out of the house much, but it will at least talk to the outside world. The next generation of ‘smart’ appliances will likely connect to your phone, negotiate rates with the power company, and even communicate with other appliances.”

Ref: [http://www.oveninfo.com/features/what-is-a-smart-appliance?utm\\_source=series&utm\\_medium=referral&utm\\_campaign=collab](http://www.oveninfo.com/features/what-is-a-smart-appliance?utm_source=series&utm_medium=referral&utm_campaign=collab)

# The smart fridge

- “Some Samsung refrigerators, like the RF4289HARS, have built-in touch-screens that can keep track of the food in your fridge and find recipes to match that inventory. And like tablets or smartphones, these fridges can also run apps and hook up to social-media networks.”



Refs: <http://www.usatoday.com/story/money/business/>

[2013/04/08/high-tech-home-improvement-kitchens/2043807/](http://www.usatoday.com/story/money/business/2013/04/08/high-tech-home-improvement-kitchens/2043807/)

<http://www.refrigeratorinfo.com/Features/Samsung-s-Smart-Home-Gets-a-Small-Update.htm>

# The smart washing machine

- GE washing machines with CleanSpeak can pass information to their companion dryers about how much moisture is left in the clothes and how long the drying cycle should last.
- Use with the GE Appliance Communication Module and Network Energy Manager.

Refs: <http://www.usatoday.com/story/money/business/2013/04/08/high-tech-home-improvement-kitchens/2043807/>  
<http://www.geappliances.com/home-energy-manager/pop-video2.htm>



# The smart vacuum cleaner

- LG's Hom-Bot uses Smart ThinQ™ technology which enables it to interact with an Android or iPhone app and provides a live video feed from its built-in camera. It can be sent rolling to a specific point in the house in 'Patrol' mode. The homeowner can also log-in remotely through a Wi-Fi connection.

Ref: <http://www.engadget.com/2011/09/02/lg-hom-bot-2-0-smart-robot-vacuum-cleaner-hands-on-video/>



# The healthy smart home

- “Monitored by internet-connected health sensors, people’s activity in the house will be monitored to ensure people’s health”.
- Ref: Future internet craves speed, The Sunday Mail, April 14, 2013

# WiSee monitors your moves



Ref: <http://www.youtube.com/watch?v=VZ7Nz942yAY>

# Smart Pyjamas for the kids

- These pyjamas have a series of dot patterns embedded in the cloth which are capable of interacting with smart devices. By scanning a group of dots with a smart phone, the child or parent will be able to read a bedtime story directly from the smart phone.



Ref: [http://www.youtube.com/watch?feature=player\\_embedded&v=Dn7IhFswv90](http://www.youtube.com/watch?feature=player_embedded&v=Dn7IhFswv90)

# Google and the smart grid

- Essential reading is *The New Digital Age: Reshaping the Future of People, Nations and Business* by Eric Schmidt, executive chairman of Google, and Jared Cohen, director of Google Ideas.
- Endorsed by Richard Branson, Henry Kissinger, Tony Blair and Bill Clinton.
- Google's vision for the future – and it has the money, technology and connections to implement it...

# Google's plan for the future

Virtual reality will make “the online experience as real as life itself, or perhaps even better”. Everything will be personalised, tuned to your habits, desires and goals... translucent screens that follow you around the apartment and house robots\* with a programme of chores to be completed while you are out...

(\*Janet Jetson had one of these)

Ref: Bryan Appleyard, The Future According to Google,  
<http://bryanappleyard.com/the-future-according-to-google/>

# Google's plan for the future

- Opting out by going “off grid” will be seen as suspicious and needing special attention. In Google's chapter on terrorism, in *The New Digital Age*, governments will be suspicious of anybody who strives to be “online anonymous”.
- Travel restrictions and even more airline screening will ensue for these people.

Ref: Bryan Appleyard, The Future According to Google,  
<http://bryanappleyard.com/the-future-according-to-google/>

# Google and the smart grid

- Google is a major investor in promoting smart grid technology.
- \$2.65 million to the Energy Foundation to influence “energy reform” in the US.
- “Greenwashing” to get the environmental movement onside?
- Google is also a major investor in cloud computing which the smart grid will use for all that data storage.



Interestingly, the architectural style depicted in the Jetsons is known as the Googie style.

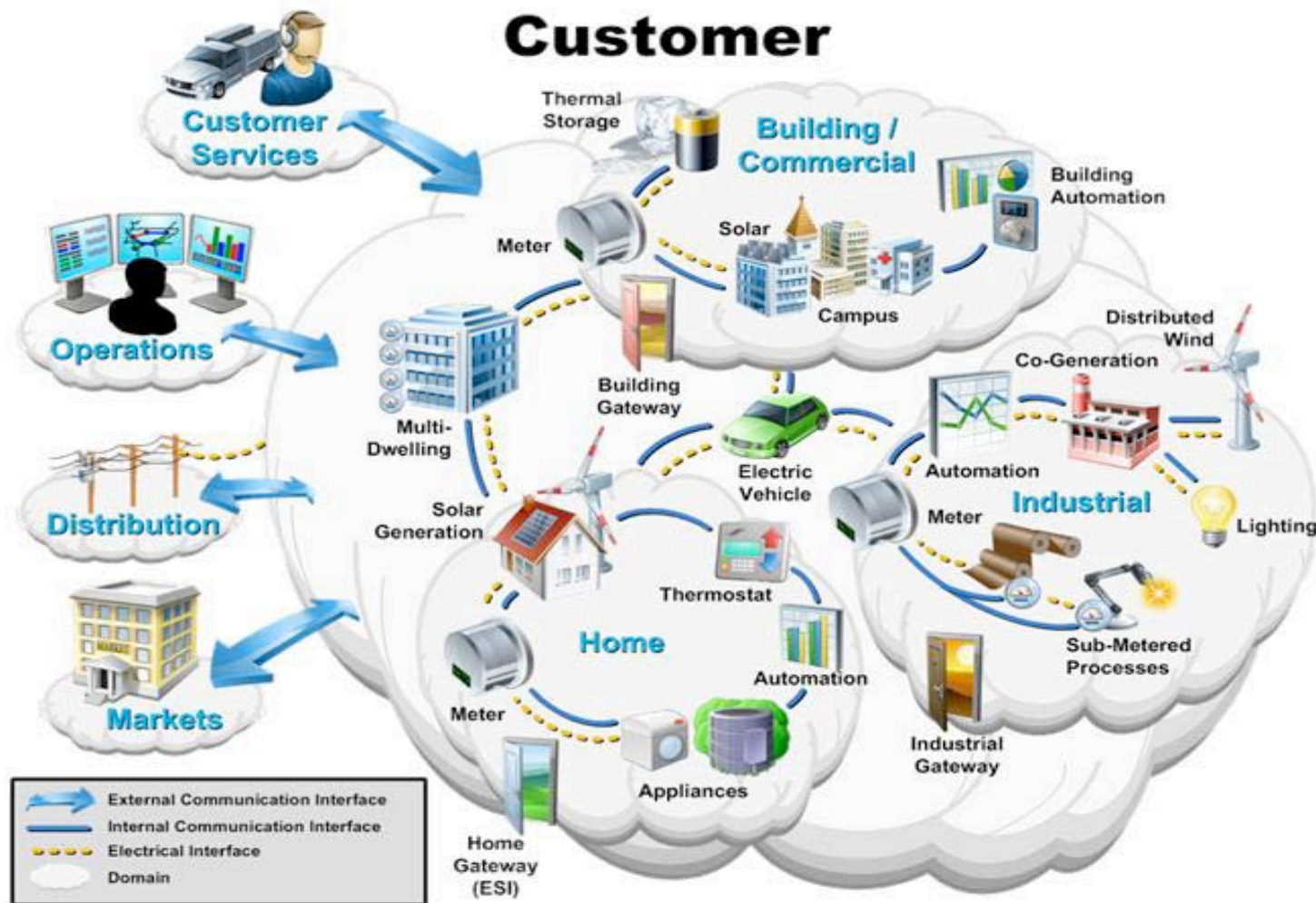
# Will the smart meter wireless “cloud” be energy efficient?

- “Cloud computing” consists of a computing system of high-end networks of distant server computers (data centres) which manage third-party services providing device-independent, reliable, continuous connectivity.
- By 2015, the energy used to run these data centres will be a “drop in the ocean” compared to the energy required to run the wireless networks used to access cloud services (such as the smart grid).

Ref: **Clouds real ecological timebomb:** Wireless, not data centres,

<http://www.computerworld.com.au/article/458439/>

[cloud\\_real\\_ecological\\_timebomb\\_wireless\\_data\\_centres/](#)



Ref: <http://pediain.com/seminar/images/smart-grid.jpg>

Also see: Enabling the SmartGrid through Cloud Computing,

<http://energy.gov/sites/prod/files/>

Friday\_Trinity\_Ballroom\_3\_0855\_Primetica\_final.pdf

# Energy consumption of wireless networks

- “The energy use of cloud services accessed via wireless networks is expected to grow up to 460% between 2012 and 2015, **the equivalent of 4.9 million new cars on the roads**. The analysis shows that wireless access networks (Wi-Fi and 4G LTE) will be responsible for 90% of that energy. Data centres, the focus of recent high-profile Greenpeace research, account for only 9%.”

Ref: **The Power of Wireless Cloud**, The Centre for Energy-Efficient Telecommunications (CEET): Alcatel-Lucent, Bell Labs and University of Melbourne, <http://www.ceet.unimelb.edu.au/news-events/news.html>

# “Wireless is an energy monster”

- “The problem is that we’re all accessing cloud services – things like webmail, social networking and virtual applications – over wireless networks. **It’s the modern way, but wireless is an energy monster; it’s just inherently inefficient.**”

Ref: CEET, ibid.

# The NSA PRISM Program

- A secret US National Security Agency (military) program that has direct access to the servers of major service providers including Google, Apple, Facebook, Microsoft, Yahoo, Verizon, PalTalk, YouTube, Skype, AOL, etc.
- This effectively covers the vast majority of online email, search, video and communications networks (including US cloud servers).



# The NSA PRISM Program

- “...data it is able to obtain: email, video and voice chat, videos, photos, voice-over-IP ( Skype, for example), chats, file transfers, social networking details, and more.”

Ref: <http://www.guardian.co.uk/world/2013/jun/06/us-tech-giants-nsa-data>

- Allows for the monitoring of all customers of the previously named providers who live outside the U.S. and Americans who communicate with people outside the U.S.

# The NSA PRISM Program

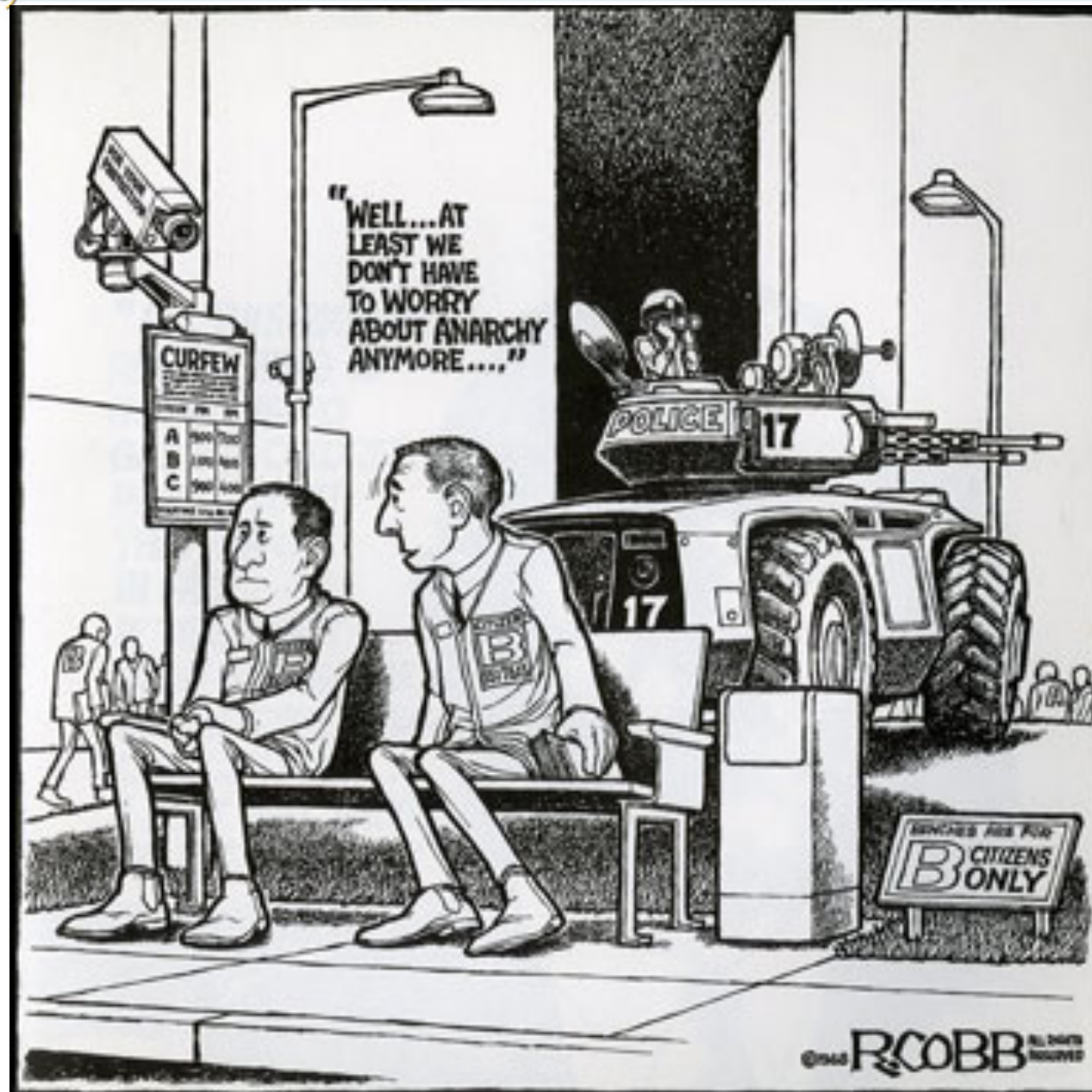
- Concerns have been raised on the security of data stored on cloud servers based in the U.S.
- This program means that an individual's online and "smart grid" energy profile is available to the NSA if it wants it.

**But why worry? I've got nothing to hide.**

# The NSA PRISM Program

- “Security and police agencies have been increasingly conflating terrorism and extremism with peaceful citizens exercising their democratic rights to organise petitions, protest and question government policies, said Jeffrey Monaghan of the Surveillance Studies Centre at Queen’s University in Kingston, Ontario.”
- “In 2011 a Montreal, Quebec, man who wrote letters opposing shale gas fracking was charged under Canada’s Anti-Terrorism Act.”

Ref: <http://www.guardian.co.uk/environment/2013/feb/14/canada-environmental-activism-threat>

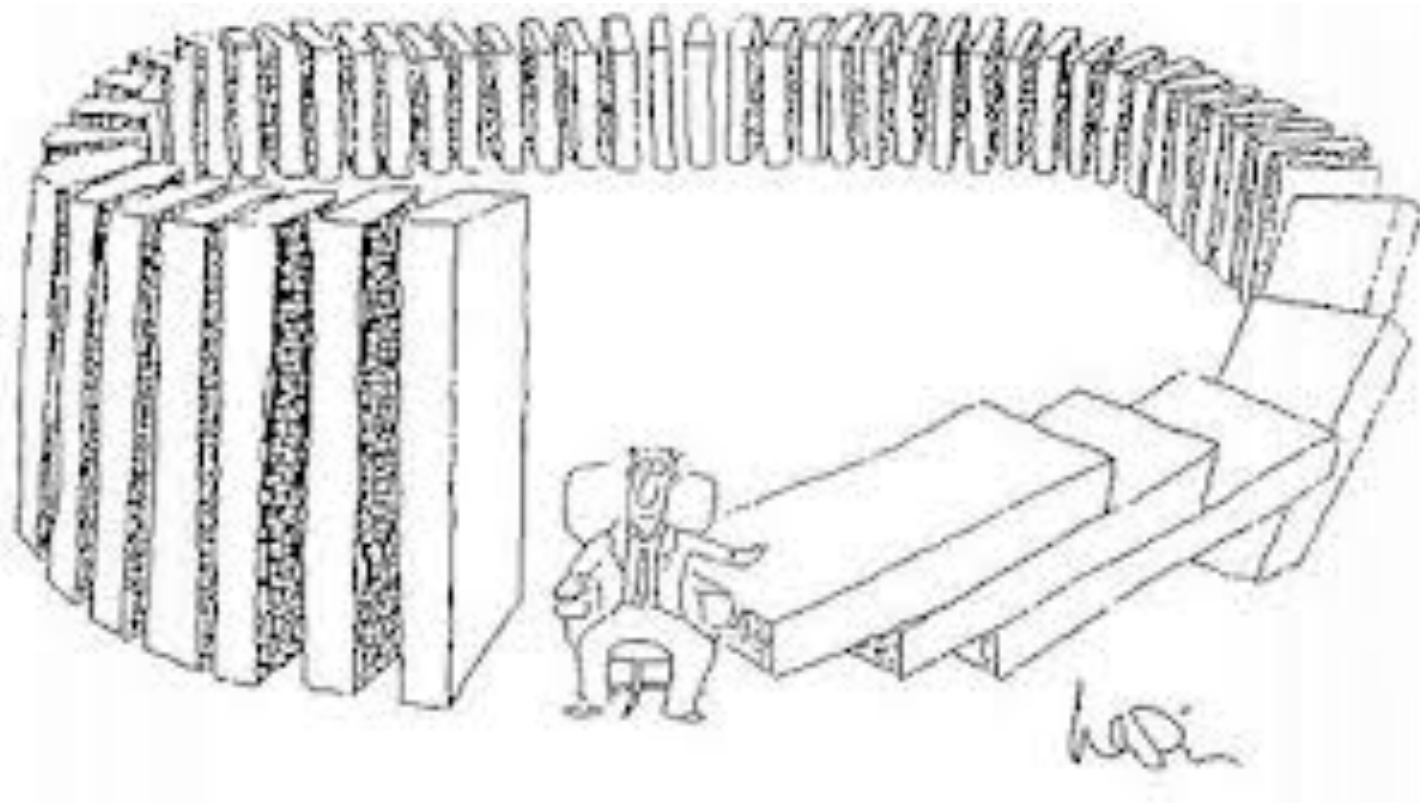


# Reflections on a smart world

“Commodities just become more marvelous; young, urban professionals sleep, work and shop with greater ease and comfort; democracy is insidiously subverted by technologies of surveillance, and control is enthusiastically rebranded as ‘participation’; and our present world order of systematized domination, intimidation and oppression continues, unmentioned, unafflicted or only faintly perturbed.”

Ref: “The Banality of ‘Don’t Be Evil’”  
by Julian Assange,  
*The New York Times*, June 1, 2013

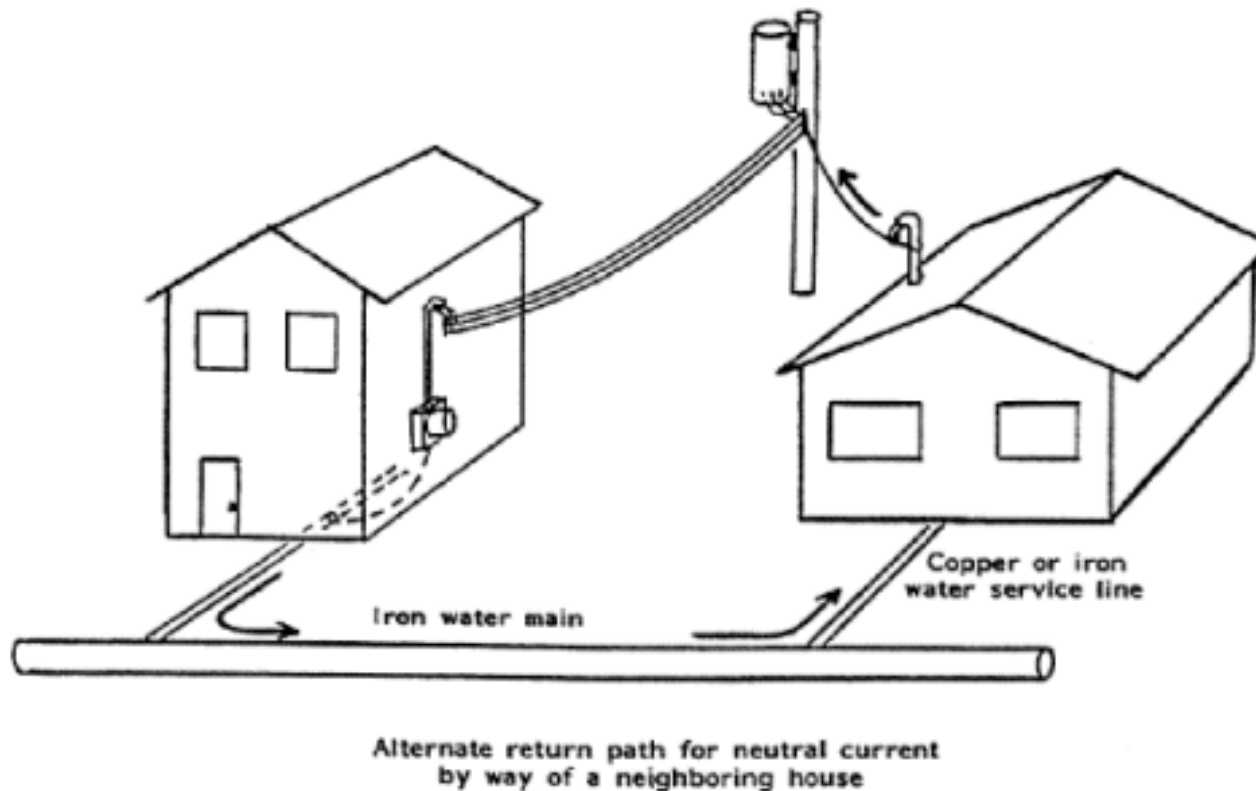
# Those unintended consequences



“There has been insufficient analysis to fully understand potential perverse outcomes, risks, and unintended consequences for consumers.”

Page 10 of the Victorian Auditor-General's 2009 Report: **Towards a 'smart grid' – *the roll-out of Advanced Metering Infrastructure***  
**<http://www.audit.vic.gov.au/publications/2009-10/111109-AMI-Full-Report.pdf>**

# Will ground currents increase smart meter billing?



Ref: <http://www.emfservices.com/ground.htm>

# Ground currents as reactive power

- “Reactive currents represent ‘unused’ energy that has been discharged onto the power lines from the impedance load as the source voltage modulates. Each piece of connected equipment adds to the total reactive current on the neutral wire which in turn is connected to the electrical system’s ground. **The level of these reactive neutral/grounding currents can be considerable.”**

Ref: <http://www.equitech.com/articles/bpng.html>

# The big question?

- Existing analogue power meters do not read reactive currents and you are not charged for it.
- “Electronic meters offer several benefits. In addition to measuring instantaneous power, they can measure other parameters such as power factor and reactive power.”

Ref: [http://www.analog.com/library/analogdialogue/archives/43-01/smart\\_metering.html](http://www.analog.com/library/analogdialogue/archives/43-01/smart_metering.html)

- So, if your home has ground electrical currents on your metal water pipes, will you be paying for it with an electronic or smart meter?

# Smart meters and bedrooms

- Smart meters are rapidly replacing existing analogue electricity meters nationwide.
- Many homes have the analogue meter box on a bedroom wall and when this has been replaced with a smart meter there are widespread reports of insomnia and fatigue afterwards.

**Why, if smart meters only transmit usage data briefly, once every four hours?**

# Consider the totality of transmissions

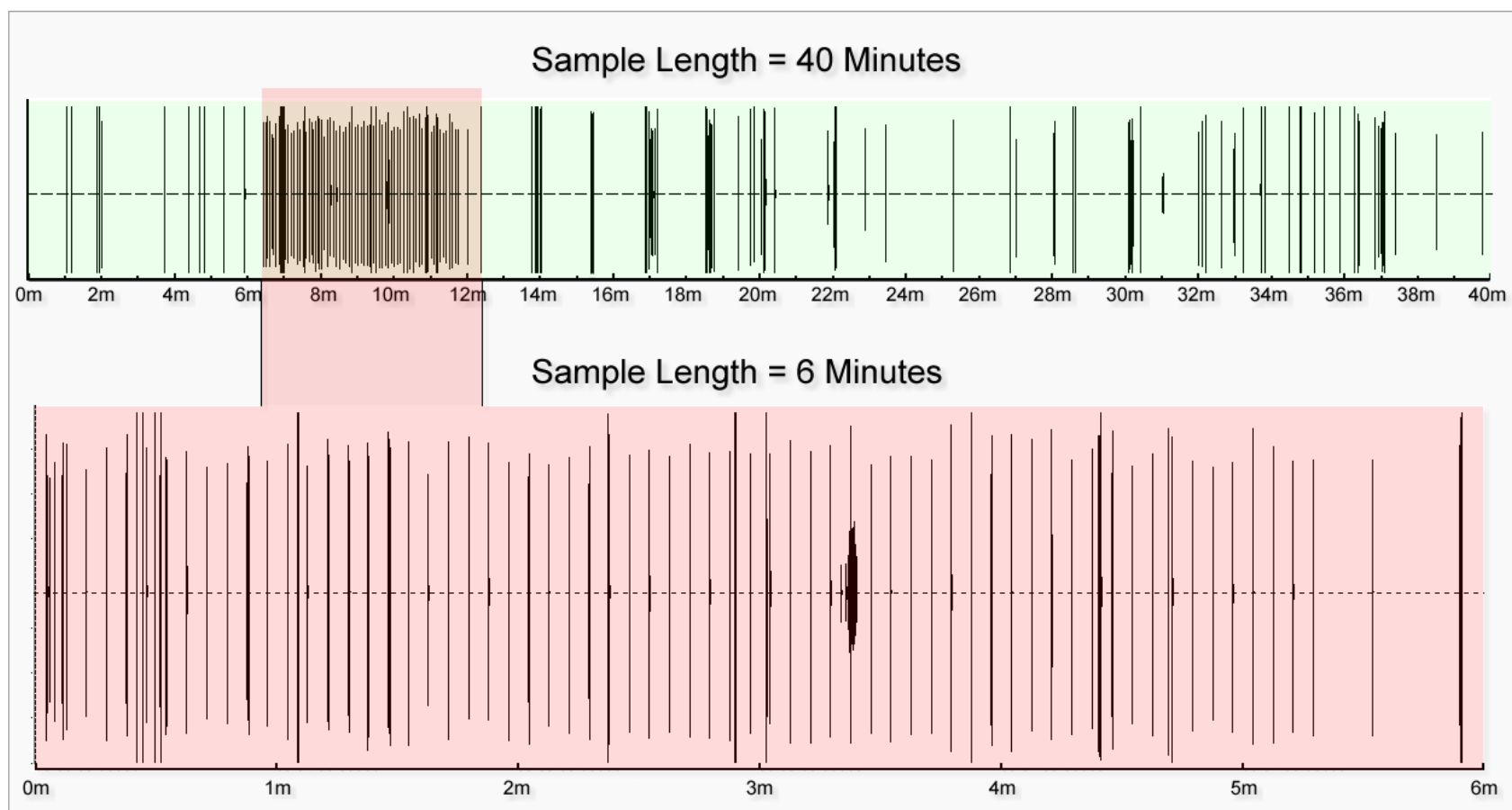
TABLE 2-1

Electric System Message Type [a]	Transmission Frequency Per 24-Hour Period: Average [b]	Transmission Frequency Per 24-Hour Period: Maximum (99.9 <sup>th</sup> Percentile) [c]
Meter Read Data	6	6
Network Management	15	30
Time Synch	360	360
Mesh Network Message Management	9,600	190,000
Weighted Average Duty Cycle	45.3 Seconds <sup>d</sup>	875.0 Seconds

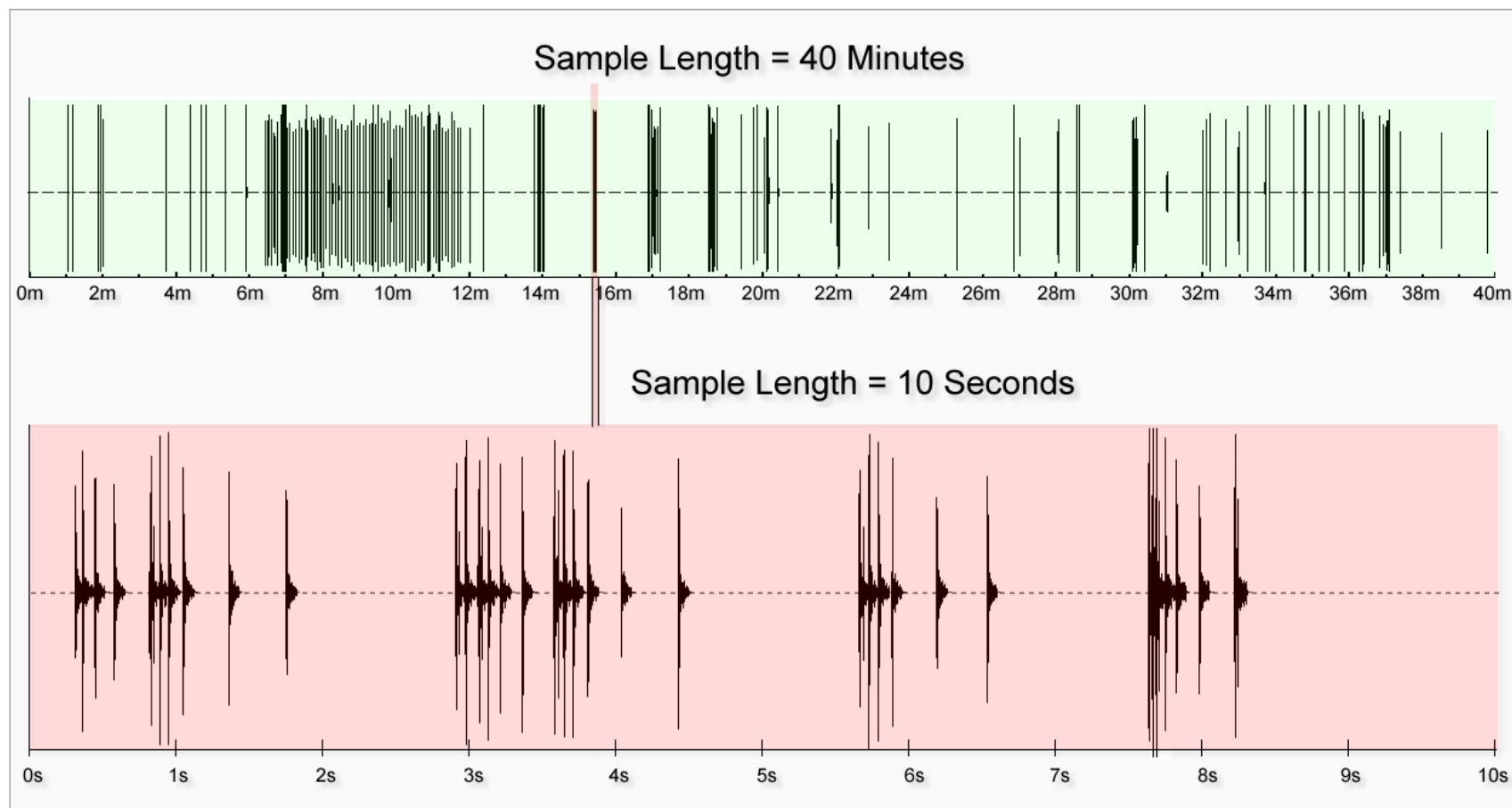
**NOTE: For the 900 MHz radio only.**

Ref: Pacific Gas and Electric Co.,  
[http://emfsafetynetwork.org/wp-content/uploads/2011/11/PGERFDataOpt-outalternatives\\_11-1-11-3pm.pdf](http://emfsafetynetwork.org/wp-content/uploads/2011/11/PGERFDataOpt-outalternatives_11-1-11-3pm.pdf)

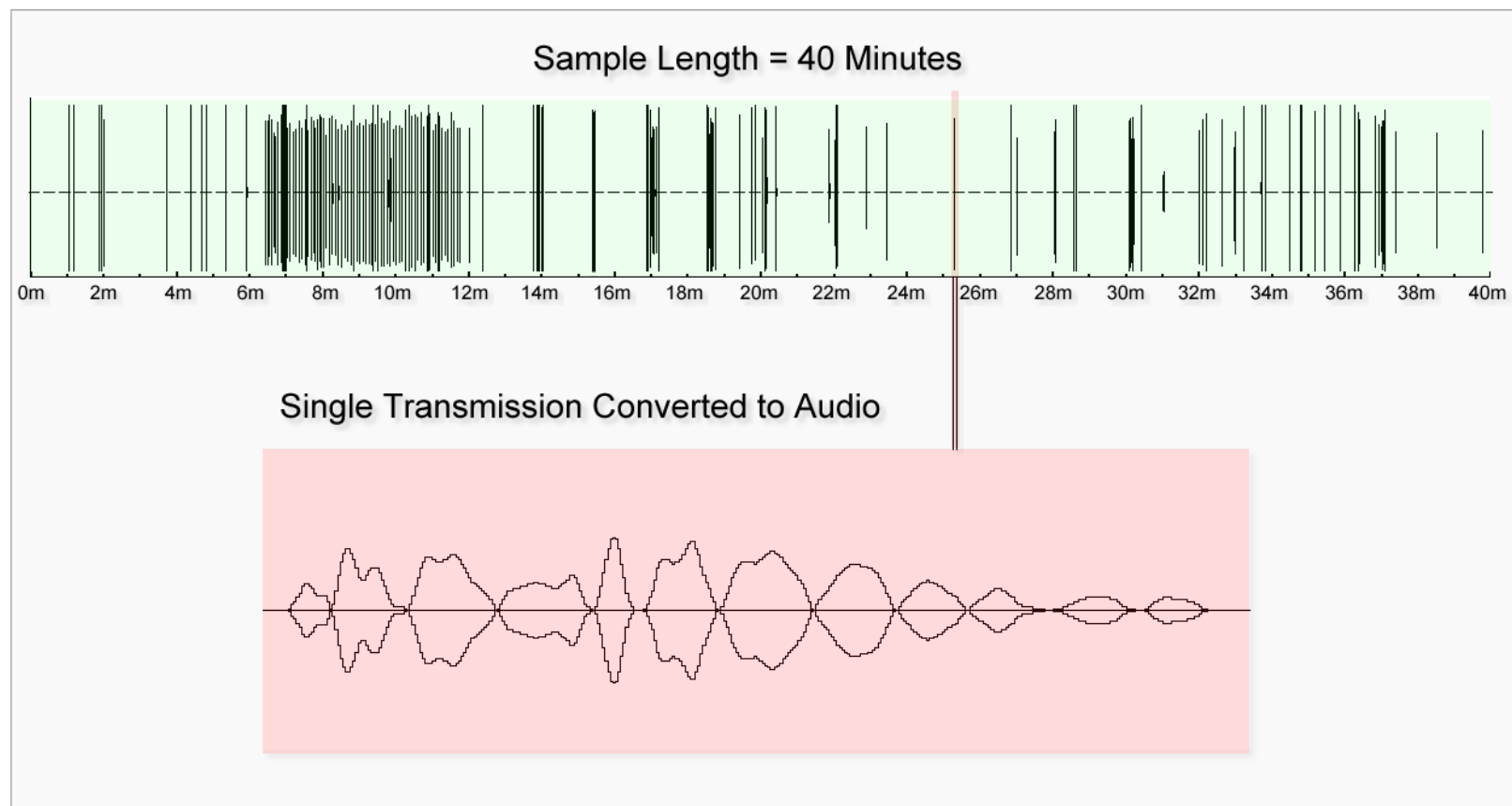
## SMART METER TRANSMISSION INTERVALS



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## SMART METER TRANSMISSION INTERVALS



## The problem with 900 MHz

- A number of studies have pointed out that electromagnetic energy in the 900 MHz region may be more harmful because of its greater penetrating capability compared to 2450 MHz; therefore, more energy in the 900 MHz frequency range is deposited deeply within the biological tissue.

# The problem with 900 MHz

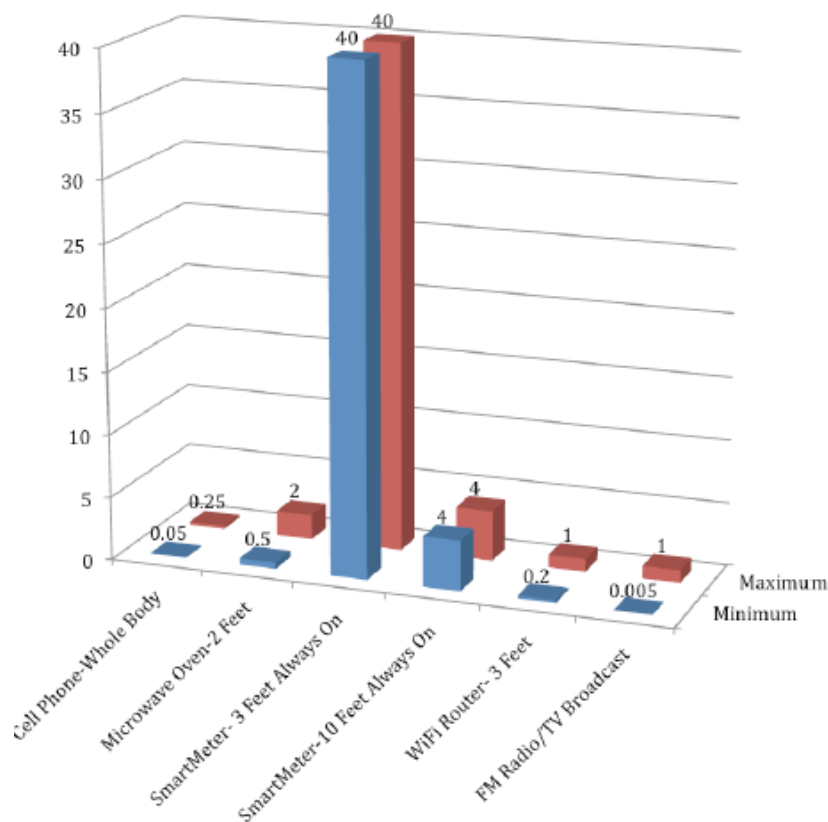
- In 1976, Lin concluded that 918 MHz energy constitutes a greater health hazard to the human brain than does 2450 MHz energy for a similar incident power density.
- Studies of diathermy applications consistently show that electromagnetic energy at frequencies near and below 900 MHz is best suited for deep penetration into brain tissue.

Ref: Marko Markov, Research International, Williamsville, NY, USA & Yuri G. Grigoriev, Russian National Committee of Non-Ionizing Radiation Protection, Moscow, Russia  
<http://www.viewdocsonline.com/document/6kn1ey>

## SMART METER EXPOSURE LEVELS

California Council on Science  
and Technology (CCST)

*After correcting for duty cycle and  
dissimilar units....*



**Cumulative whole  
body exposure of  
Smart Meters is two  
orders of magnitude  
higher than cell  
phones.**

**SOURCE:** Daniel Hirsch, Comments on the Draft Report by the California Council on Science and Technology "Health Impacts of Radio Frequency from Smart Meters", 31 January 2011

# Case 1

“My symptoms started the night the smart meter was installed (externally on the bedroom wall). 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.”

Ref: Personal interview

## Case 2

“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.”

Ref: <http://stopsmartmeters.com.au/health-researchsafety/>

## Case 3

“Since my smart meter was installed, I have experienced shortness of breath, palpitations, and headaches mainly at the back of my head. Could it be because the position of the meter is on the other side of the wall where I sit every night while watching TV? What can I do about it? I have no room to change the position of the couch and my symptoms are getting worse by the day.”

Ref: <http://stopsmartmeters.com.au/health-researchsafety/>

## Case 4

“It is very likely that your new smart meter or your neighbour’s (if their meter is close by) is affecting you. I experienced the same issues as you described from my neighbour’s two smart meters located three metres from my bedroom. After complaining to Powercor, I found that they must have reconfigured them as they are not communicating as much (confirmed with an EMF meter). My heart palpitations/ pain in my chest has gone but I still am waking up with headaches (although they are not as intense as before the meter was reconfigured).”

Ref: <http://stopsmartmeters.com.au/health-researchsafety>

## Case 5

“I have developed ringing in my ears that would go away when I went to work. Now I have had two months off work, the ringing is constant. I have developed a thyroid problem since the smart meter was installed. I wake up aching. The meter is next to my bedroom wall.”

Ref: <http://stopsmartmeters.com.au/health-researchsafety>

## Case 6

“Our smart meter was installed about two years ago. Our town in central Victoria was one of the earliest in the roll-out. Since its installation (outside my bedroom window), my health and the general health of my family has gone downhill rapidly...I suffer from severe headaches, memory loss, loss of motor skills. I feel as though I am walking around in a haze. I lie awake until daylight some nights, and others it is 1-2 pm when I wake up. There is also the high-pitched squeal that the smart meter emits constantly.”

Ref: <http://stopsmartmeters.com.au/health-researchsafety>

## Case 7

“I came to Australia after a smart meter was fitted two metres below my bedroom window in NZ. I was not informed of the radiation danger. I subsequently experienced severe health problems and was at a loss to explain this. One of my students wrote a report about her own experiences with smart meters and I had to mark it. I began to put two and two together. The report probably saved me serious health problems.”

Ref: <http://stopsmartmeters.com.au/health-researchsafety>

## Case 8

“A smart meter installed Aug 2012 unbeknownst to homeowner. A high-pitched sound started that night, kept him awake. His inspection the next day found the new smart meter in his meter box. Ongoing insomnia, tinnitus and overall deterioration in health since then. Shielding has helped, but ongoing difficulty in sleep and tinnitus continues.”

Ref: Personal interview

## Case 9

“My son, aged 22, started work in a small graphic design studio in Fitzroy. After only being there a few weeks, he started to become quite unwell. He was getting severe dizziness, headaches, couldn't see straight or concentrate and was getting heart palpitations and extreme kidney pain, so much so that he had to take several days off to recover. On returning to work, the same thing happened again and by lunchtime he had to leave. As it was a Friday, he was able to have the weekend away and started to improve.”

(continued)

## Case 9, continued

“The next week, his problems recurred yet again and it was then that he discovered that there was a smart meter situated inside a wooden box only about two metres from his head. (Just to rule out any other cause, he underwent medical tests – ECG, blood test and kidney scan – which all came back clear.) Finding that he was only getting worse at work, he felt he had no alternative but to resign. He is now ‘sensitised’ to EMR and gets quite dizzy when exposed to it.”

Ref: personal interview

# The Schwarzenburg transmitter study

- As a result of ongoing health complaints, the Swiss government's energy agency (SFDTE) commissioned a study of the residents surrounding the transmitter site.
- Significant associations were found with proximity and health problems, primarily restlessness, falling asleep and ability to maintain sleep.

Ref: [www.avaate.org/IMG/pdf/som\\_11\\_05.pdf](http://www.avaate.org/IMG/pdf/som_11_05.pdf)

# The Schwarzenburg transmitter study

- 55% of residents suffered from disturbed sleep.
- 35% suffered from insomnia.
- Similar effects seen in a New Zealand transmitter site in Ouruhia: 37% suffered from fatigue and 35% suffered from sleep problems.
- These are apparently at power levels similar to when a smart meter is in close proximity to a bed.

Ref: [www.avaate.org/IMG/pdf/som\\_11\\_05.pdf](http://www.avaate.org/IMG/pdf/som_11_05.pdf)

# The Schwarzenburg transmitter study

- Sleep disturbance was associated with a maximum exposure of  $18.5 \text{ mW/m}^2$ , with a mean nocturnal exposure of less than  $7 \text{ mW/m}^2$ .
- People living in a mean RF exposure of  $38 \text{ mW/m}^2$  had significantly elevated levels of restlessness, sleep disruption, aches and pains.

Ref: N. Cherry, Swiss shortwave transmitter study sounds warning,  
*Electromagnetics Forum*, Vol. 1, No. 2, Article 10,  
[http://www.emfacts.com/forum/issue2/mag\\_9.html](http://www.emfacts.com/forum/issue2/mag_9.html)

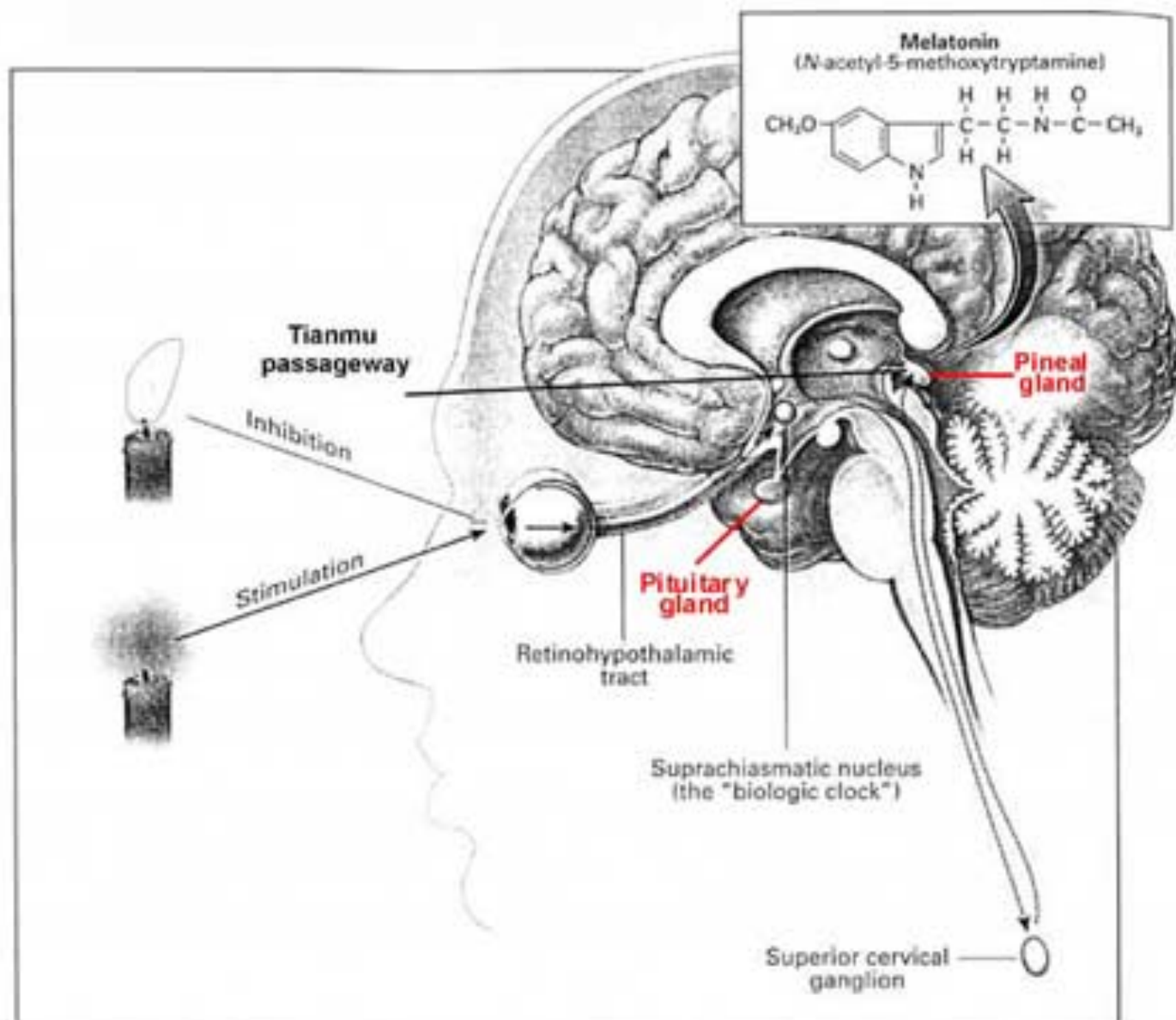
# The Schwarzenburg transmitter study

- “Our findings support a relationship between operation of the radio transmitter under investigation and sleep disturbances in the exposed population... From a public health perspective, our findings call for caution in exposing populations to EMF from short-wave radio transmitters.”

Ref: <http://www.ideaireland.org/2006.00%20Altpeter%20et%20al.pdf>

# The Schwarzenburg transmitter study

During the course of this research the transmitter failed for 3 days and during that period individuals experienced improved sleep that was detected after a 1-day delay. Neither the researchers nor the residents were aware of the malfunction, discounting a placebo effect.



# Russian occupational research

- Prolonged exposure to low-level powerfrequency and RF can act as an immune system stressor and can manifest in a multitude of symptoms, not just cancer.
- Biological effects depend upon individual sensitivity, duration of exposure, field strength, frequency and kind of field.

Ref: Hecht, K., Balzer, H.U., 1997, 'Biological Effects of Electromagnetic Fields on Humans in the Frequency Range 0 to 3 GHz: Summary and results of a study of Russian medical literature from 1960-1996', German Federal Ministry for Postal Services and Telecommunications, Berlin

## Symptoms reported in Russian literature

- Fatigue and slow recovery of energy, increased agitation (emotional upheavals), fast exhaustion, muscle weakness, reduced intellectual activity, absent-mindedness, an inability to concentrate, increased sensitivity to light/noise, disturbed dreaming/sleeplessness, headaches, unstable gait, cold hands and legs, heart problems including palpitations (slow or fast), dizziness/giddiness, irregularities in the menstrual cycle, and overactive thyroid.

Ref: Hecht, K., Balzer, H., *ibid.*

## Russian three-stage symptoms model

- **1st stage:** (Up to 3 years' exposure) Beginning of symptoms. Usually a full recovery upon removal of exposure.
- **2nd stage:** (3 to 5 years' exposure) More pronounced symptoms. Usually a gradual recovery.
- **3rd stage:** (5+ years' exposure) Highly pronounced symptoms. **Irreparable** damage to biological systems. Full recovery unlikely.

Ref: Hecht, K., Balzer, H., *ibid.*

## WHO statement

“Electromagnetic fields of all frequencies represent one of the most common and fastest-growing environmental influences about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of EMF, and the levels will continue to increase as technology advances.”

Ref: World Health Organization (WHO), Electromagnetic Fields,  
<http://www.who.int/peh-emf/en/>

**At what technological stage does this become a public health crisis?**

## Actions you can take



Ref: <http://stopsmartmeters.com.au/actions-you-can-take/>

# ATTENTION!

## Smart Meter Installer



# NO TRESPASSING

## DO NOT INSTALL SMART METER HERE

I do NOT Consent to the installation of  
**a "SMART METER"**  
AT THIS ADDRESS:

---

Owner/Resident

**Date:** ..... (Note this sign has been photographed in position)

***Analogue Meter Reader Still Welcome***

Any person trespassing to install a smart meter will be held accountable to the law of our Australian Constitution Act (1900-01) and the Privacy Act for trespassing and are liable for a \$167,000 fine.

## Victorian legal advice

“On the work I have been able to do to date it appears that there is currently no statute that requires a domestic electricity consumer to allow a distributor onto their premises to remove an analogue meter and install a ‘smart meter’, otherwise known as ‘Advanced Metering Infrastructure’ or ‘AMI’.”

Read full advice here:

<http://stopsmartmetersau.files.wordpress.com/2012/12/legal-advice-oct-2012.pdf>

# Recommendations in a perfect world

- A moratorium should be placed on any further roll-out of smart meter technology until the extent of a possible public health risk is quantified by independent research with oversight.
- Research funding to conduct sleep studies should be an urgent priority.



PhD thesis by Don Maisch

“The Procrustean Approach: The manipulation of telecommunications standards at the expense of public health protection”

<http://www.emfacts.com/the-procrustean-approach/>