Automatic Meter Reading/ Advanced Metering Infrastructure Project (AMR/AMI)

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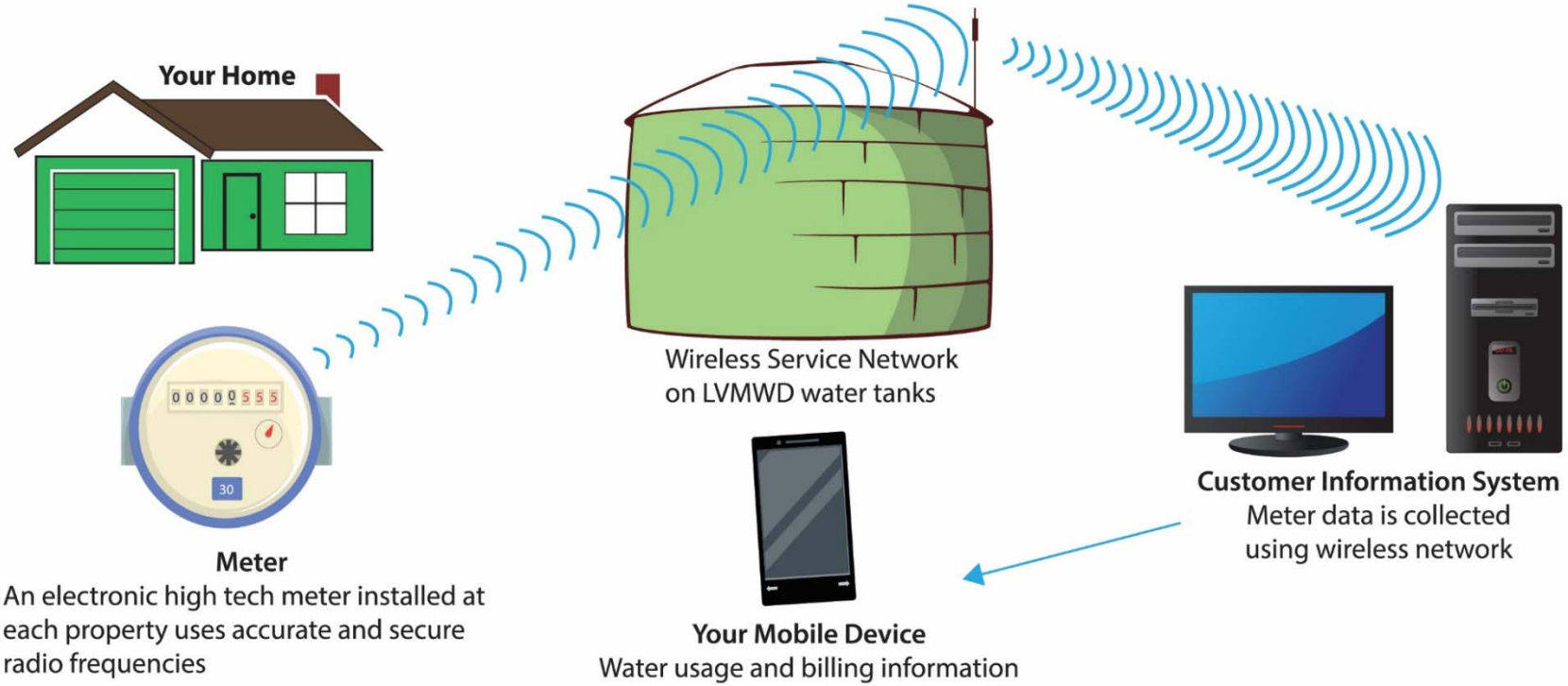
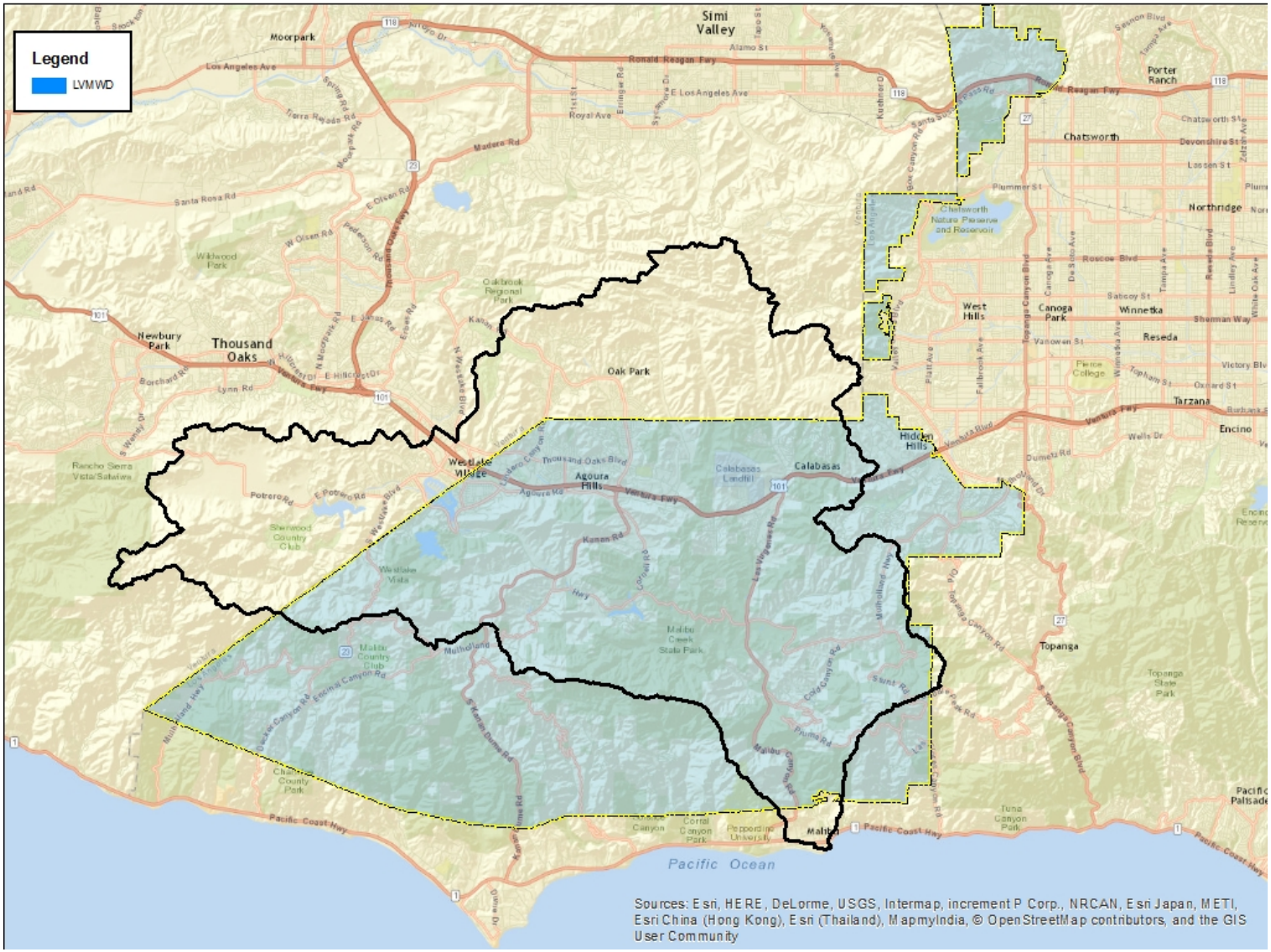
Project Description

The Project consists of replacing approximately 21,000 manually-read water utility meters within the Las Virgenes Municipal Water District (LVMWD) service area with Advanced Metering Infrastructure (AMI) or "Smart Meters" that will automatically relay meter data wirelessly on a near-continuous bases.

How Automated Meter Reading/Advanced Metering Infrastructure (AMR/AMI) Works





LAS VIRGENES MUNICIPAL WATER DISTRICT

Project Benefits

- 5 to 10 percent reduction in water use (1,000 to 2,000 acre-feet)[1]
  - Leak detection
  - Better informed water use
- Compliance with AB 1668/SB 606
- Less reliance on Sacramento-San Joaquin Delta / more water for the Delta
- Reduced CO2 emissions
  - 2,910 to 5,820 tons[2]

1) Based on various case studies including "The Effect of Social and Consumption Analytics on Residential Water Demand" -Nemati, Buck, Soldati (2016)
2) Based on Table 1-3 of California's Water – Energy Relationship, California Energy Commission (2005)

Project Benefits

- Improved customer service
- Expedite monthly customer usage reporting and billing
- Enhanced water budget implementation
- Assistance with billing disputes and claims resolution
- Improved personnel safety (i.e. no need to repeatedly lift meter lids)
- Detection of meter tampering and reverse flow

Annual CO_2 Reduction Equivalencies

- 618-1,236 passenger vehicles driven
- 7 to 14 million miles driven by the average passenger vehicle
- 3 to 6 million pounds of coal burned
- 6,737 to 13,474 barrels of oil consumed
- 110,525 to 221,050 incandescent lamps switched to LEDs
- 3,425 to 6,850 acres of trees

Google: Greenhouse Gas Equivalencies Calculator US EPA
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Case Studies

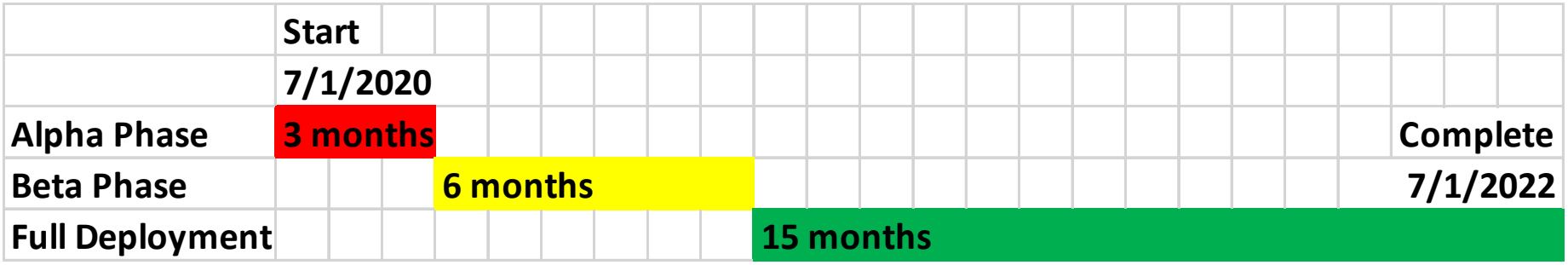
- City of Folsom - 7% reduction in water use
- City of Austin – 9% reduction of water use
- Channel Islands Beach Community Services District – 9% reduction of water use

Cost

- $31.1 million – 15 year life cycle cost (manual read)
  - $8.18 cents per month (average)
- $33.4 million (AMR/AMI)
  - $8.79 cents per month (average)
- Delta of $2.3 million over 15 years
- 33 cents per month per customer (average) when factoring in the grant
- Can prioritize use of penalty funds (wasteful water users to pay)
- 15,000 meters need changed out w/in the next 5 years at a cost of $2.9 million

- Note: average LVMWD residential water bill is $120 per month

Schedule



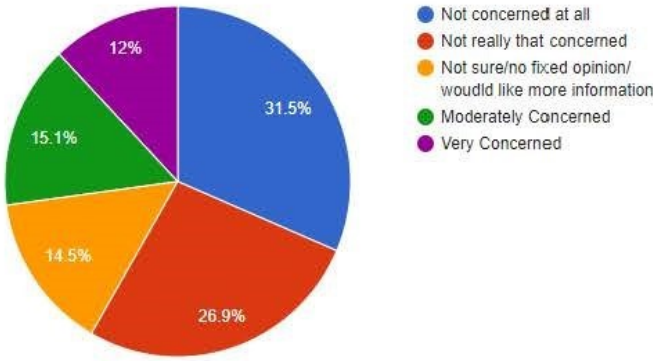
- Alpha Phase: 100 meters
- Beta Phase: 2,000 meters
- Full Deployment: ~ 19,000 meters

Public Acceptance

- Survey conducted September 2019 – 1,330 responses
- 73.9% of respondents support the installation of Smart Meters

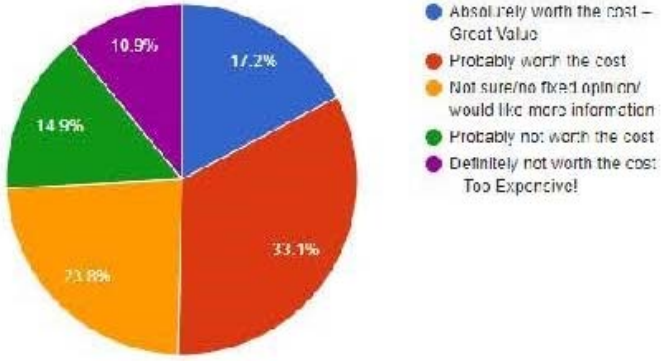
7. To what degree are you concerned about radio waves?

Answered: 1329 Skipped: 0 Left Blank: 1



8. Do you feel that the benefits to be gained are worth an additional $1.21 per month per customer?

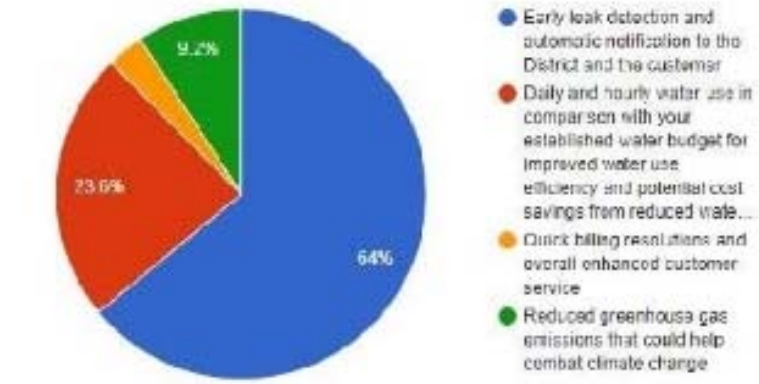
Answered: 1328 Skipped: 0 Left Blank: 2



Public Acceptance

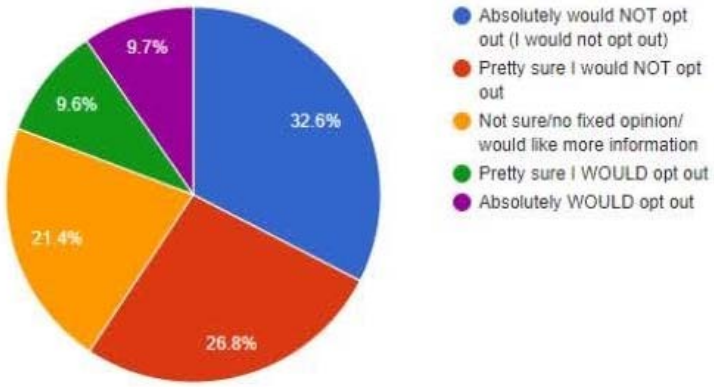
9. Which feature of "Smart Meters" do you find most appealing?

Answered: 1281 Skipped: 0 Left Blank: 49



11. Would you opt out?

Answered: 1323 Skipped: 0 Left Blank: 7



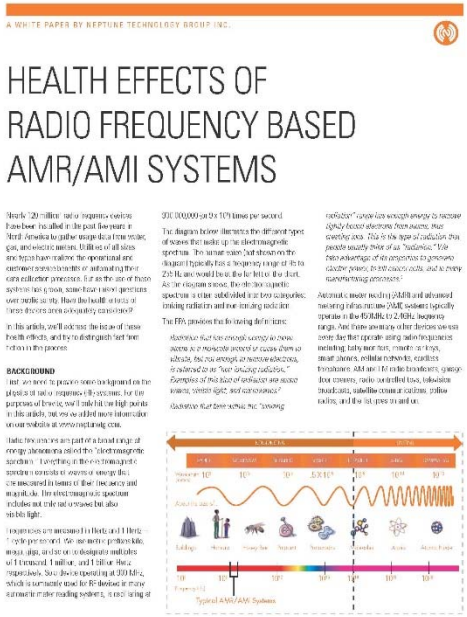
64% - Early Leak Detection and Notification to the District and the Customer.
59.4% - Would Not or Pretty Sure would not opt out.

Opt Out Policy

- Higher percentage would likely opt out if $25 per month
- Disqualify from Leak Adjustments?

Radio Waves

- "RF energy from "**Smart Meters"** does **NOT** pose a public health risk" – Health Canada



A WHITE PAPER BY NEPTUNE TECHNOLOGY GROUP INC.

HEALTH EFFECTS OF RADIO FREQUENCY BASED AMR/AMI SYSTEMS

With the explosion in social media, smart phones, WiFi, mobile streaming, GPS systems, and a myriad of other applications, the use of RF has grown exponentially. As of June 2011, the number of connected devices with wireless subscriptions was 322.8 million[4], which exceeds the estimated U.S. population[5]. Unless you live in a specially designed shielded room like an anechoic chamber, you're exposed to RF signals 24/7.

HEALTH EFFECTS

So, what is the impact of RF-based AMR and AMI systems on our health?

We'll use the terms previously identified to start the discussion. We are all aware that some levels of ionizing radiation as found in Gamma Rays, X-Rays, and certain types of ultraviolet light are harmful to our health. RF systems that are used for AMR and AMI systems fall into the category of non-ionizing radiation, as they do not have sufficient energy to change the structure of molecules with which they come in contact.

Within the non-ionizing group of frequencies, where do AMR- and AMI-equipped smart meters fall? The table below shows the relative power density in microwatts per square centimeter (μW/cm²) so that the various devices can be compared. Although water devices were not specifically measured in this independent study, they would tend to operate like gas smart meters which are also dependant on battery power and therefore can't transmit as often or at an output power as high as electric smart meters.

As we can see, the level of exposure to RF emissions is much less for smart meters (gas and water being the lowest of these) than our typical exposure to laptops, WiFi networks, and cell phones.

While there are many published opinions on the topic, the following summary from Health Canada seems to be one of the most concise:

As with any wireless device, some of the RF energy emitted by smart meters will be absorbed by anyone who is nearby. The amount of energy absorbed depends largely on how close your body is to a smart meter. Unlike cellular phones, where the transmitter is held close to the head and much of the RF energy that is absorbed is localized to one specific area, RF energy from smart meters is typically transmitted at a much greater distance from the human body. This results in very low RF exposure levels across the entire body, much like exposure to AM or FM radio broadcast signals.

Survey results have shown that smart meters transmit data in short bursts, and when not transmitting data, the smart meter does not emit RF energy. Furthermore, indoor and outdoor survey measurements of RF energy from smart meters during transmission bursts were found to be far below the human exposure limits specified in Health Canada's Safety Code 6.

Based on this information, Health Canada has concluded that exposure to RF energy from smart meters does not pose a public health risk.[6]

So there does not appear to be a link between RF emissions in AMR and AMI systems and concerns about public health.

PERSONAL EXPERIENCE

And beyond the studies, we at Neptune have some rather unique personal experience to add to the discussion.

Located at our factory and headquarters in Tallassee, Alabama, Neptune has its "meter farm" which is used for testing meters and RF devices in various environmental conditions. At any given time, there are some 1,300 operational radios located about 100 feet from our engineering office. In addition, every day thousands of new radios are manufactured, activated, and tested on site. This is a level of RF saturation that would be very uncommon even in the densest urban settings.

We ran two twenty-minute tests at our office to determine the power density in the area of our engineering office (where we work every day). It should be noted that in addition to the signals from the radios manufactured and tested on site, there are several WiFi routers, cellular boosters, and countless cell phones. These tests were not intended to isolate the source of the radio frequency signals but were designed to show the amount of ambient exposure that could be encountered in an area saturated with RF signals.

As we can see from the data below, the radio frequency exposure that we measured during these tests was far below the levels that would be encountered by a typical cell phone or walkie-talkie when held to the user's head.

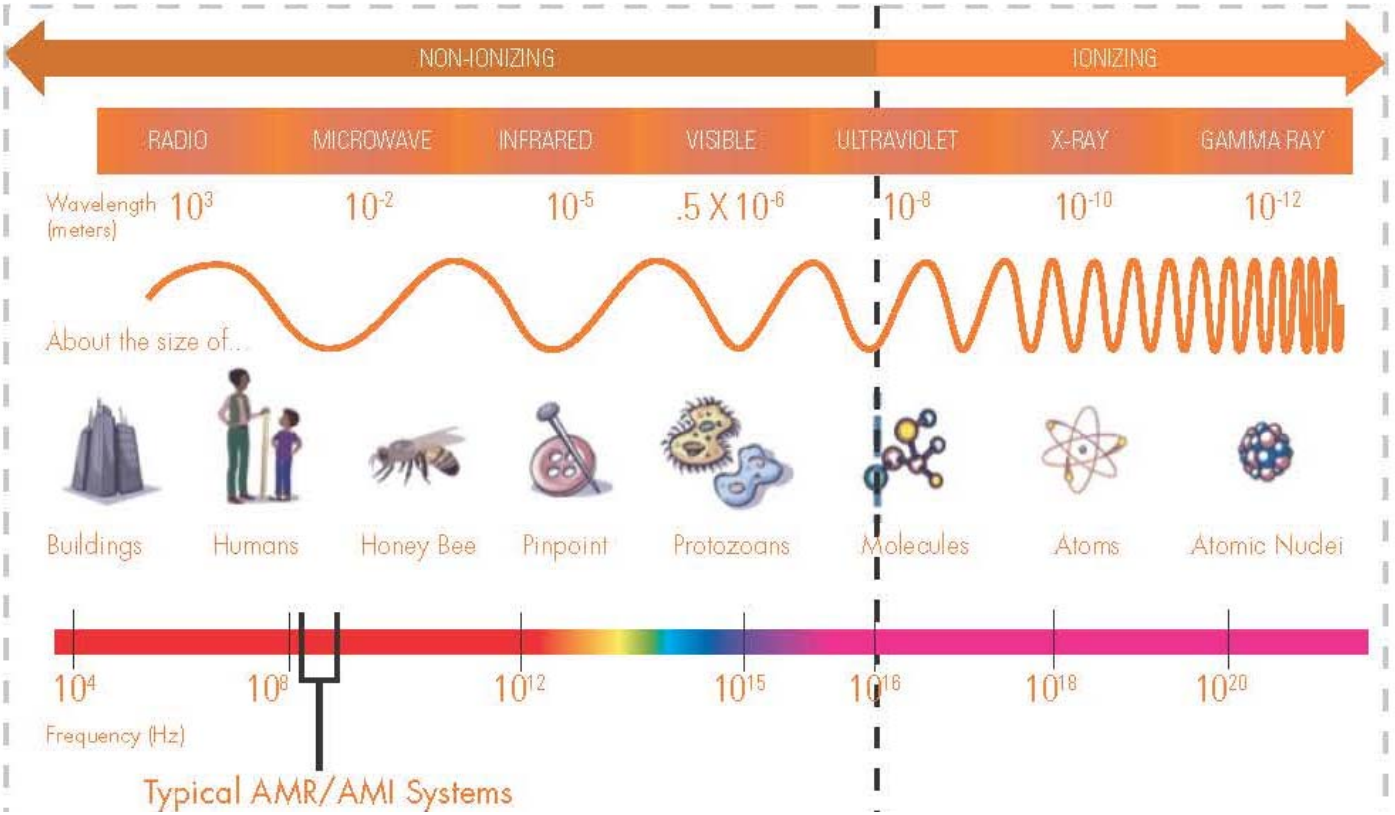
Neptune is very conscious of employee health as illustrated by the fact that we switched all bronze body meter production to lead free alloys in 2001, over a decade before legislation was enacted to mandate use of lead free materials. Although this put Neptune at a cost disadvantage, one of the primary drivers was the concern that lead exposure might have to our employees' health.

If we thought RF was bad for us, or others, we wouldn't subject ourselves to the possibility of harm.

Comparison of RF Power Density in the Everyday Environment

Adjacent to a gas Smart Meter (1 foot)	0.00166
Adjacent to an electric Smart Meter (10 feet)	0.1
Adjacent to an electric Smart Meter (1 foot)	3.3
Microwave oven nearby (1 meter)	10
Wireless routers, laptop computers, cyber cafés, etc. maximum (~1 meter for laptops, 2.5 meters for access points)	10 to 20
Cell phone (at head)	30 to 10,000
Walkie-Talkie (at head)	500 to 42,000

Radio Waves


NON-IONIZING
IONIZING
RADIO
MICROWAVE
INFRARED
VISIBLE
ULTRAVIOLET
X-RAY
GAMMA RAY
Wavelength (meters)
10^3
10^-2
10^-5
.5 X 10^-6
10^-8
10^-10
10^-12
About the size of..
Buildings
Humans
Honey Bee
Pinpoint
Protozoans
Molecules
Atoms
Atomic Nuclei
10^4
10^8
10^12
10^15
10^16
10^18
10^20
Frequency (Hz)
Typical AMR/AMI Systems

Radio Waves

Comparison of RF Power Density in the Everyday Environment
(microwatts per square centimeter, or $\mu W/cm^2$)[8]

Adjacent to a gas Smart Meter (1 foot)	0.00166
Adjacent to an electric Smart Meter (10 feet)	0.1
Adjacent to an electric Smart Meter (1 foot)	8.8
Microwave oven nearby (1 meter)	10
Wireless routers, laptop computers, cyber cafés, etc. maximum (~1 meter for laptops, 2-5 meters for access points)	10 to 20
Neptune's R-900 (Smart Meter) (from 1-foot)	**80**
Cell phone (at head)	30 to 10,000
Walkie-Talkie (at head)	500 to 42,000

Outreach

To date:

E-notified customers about project

Posted on website- including opportunity for public comment

News articles in local papers

Posts on Social Media

Future:

Bill stuffers

News releases

Door hangers

Videos

City Council Meetings

Newsletter

What a Customer can Expect

- Receive at least 48 Hour notification before meter installation
- Approximately 15 minute water shutoff
- Instructions left behind on how to setup individual customer portal
- Dedicated hotline for questions