Advanced Two-Way Metering

Looking Forward

P.U.D.
CHELAN COUNTY

June 5 2017

Seeking board guidance today

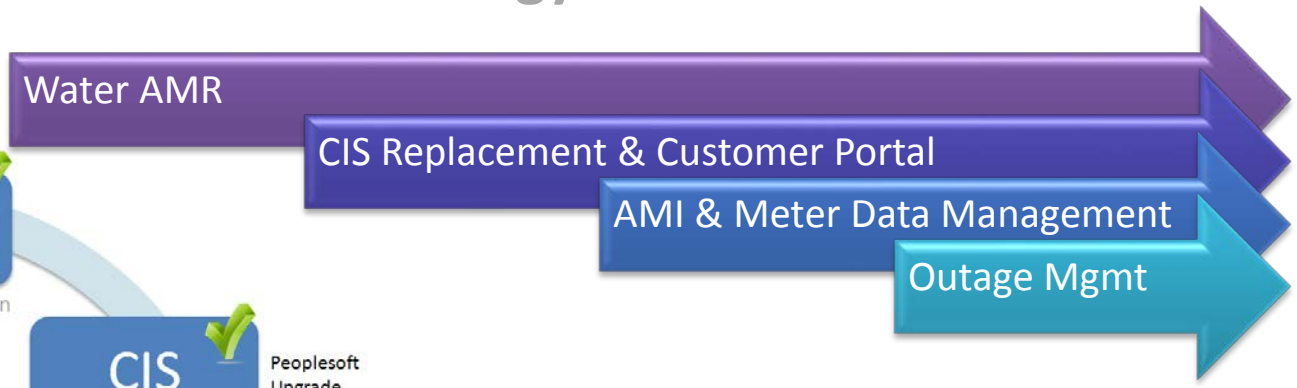
- [ ] Beginning Detailed Technical Design & Request For Proposal
  - [ ] Include Opt-Out & Opt-Up Alternatives Through the RFP

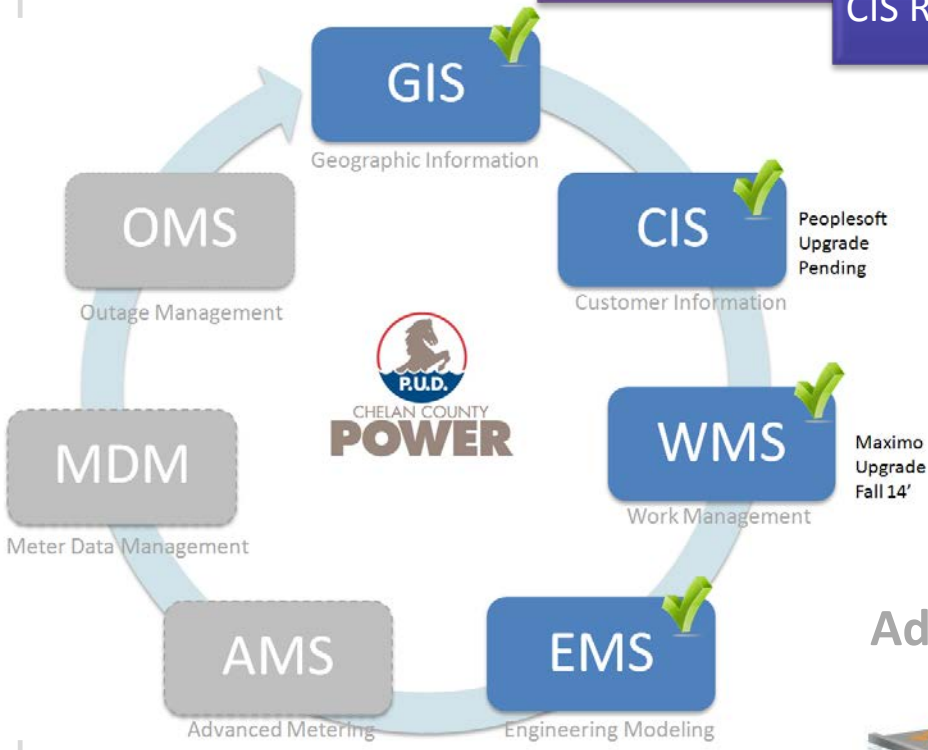
Chelan PUD's Intelligent Grid Plan

Technology Vision

- Operational Efficiencies
- Reliability Improvements
- Environmental Attributes
- Customer Choice

Technology Path Forward

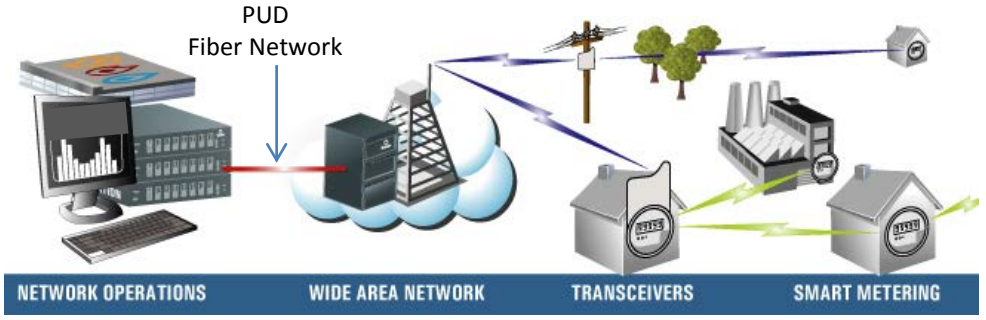




Business Intelligence

- Reducing meter reading costs
- Near real time system monitoring
- Enhanced engineering modeling
- Customer Driven Choices

Advanced Two-Way Metering Technology

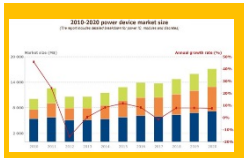


Outage Management

- Remote on/off
- Voltage monitoring
- Outage notifications

Our Past & Present Timeline With AMI

P.U.D. CHELAN COUNTY



UtiliWorks℠

2005 – 2006

ERT One-way Meters Install

13 FTE Meter Readers

Water AMR Deployment Planning

> 800 ERTs

2007 – 2008

Meter Read Contract est.

10 FTE Meter Readers

Water AMR Functional

Electric AMI RFP & Contract Negotiations

> 2000 ERTs

2008 – 2009

Economic Downturn

8 FTE Meter Readers

Electric AMI RFP & Contract Negotiations Canceled

> 4000 ERTs

2010 – 2014

Preservation Mode

6 FTE Meter Readers

Recovery Act Smart Grid Investments

Advancement In AMI Tech.

> 10,000 ERTs

2015

Review of AMI Two-way Meter

4 FTE Meter Readers

Developed Electric AMI Business Case Version 1

On-site Vendor Demonstrations

>14,000 ERTs

DistribuTech
www.DistribuTech.net

2016

Contract With UtiliWorks

2 FTE Meter Readers

Developed Electric AMI Business Case Version 2

>16,000 ERTs

2017

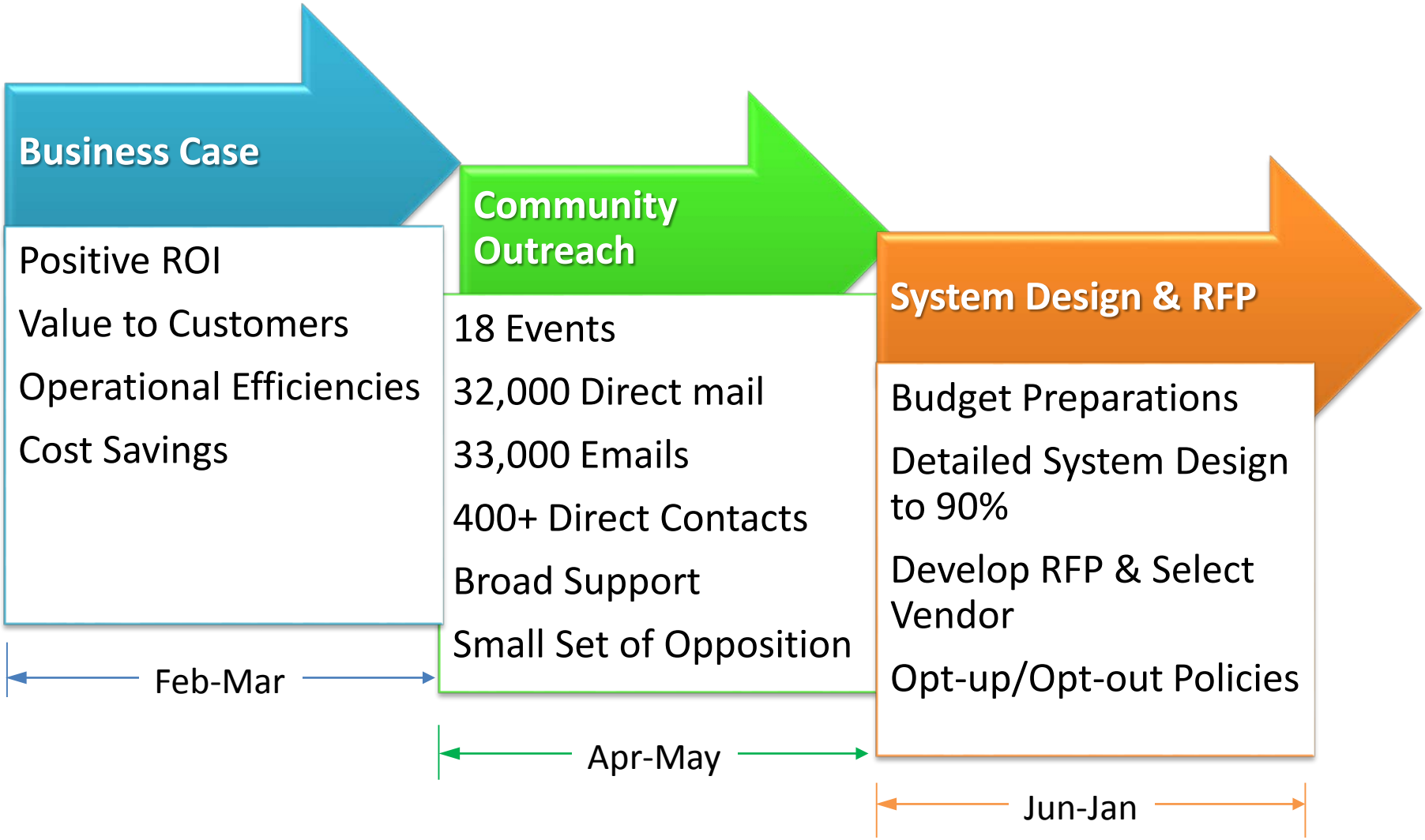
Community Outreach

2 FTE Meter Readers

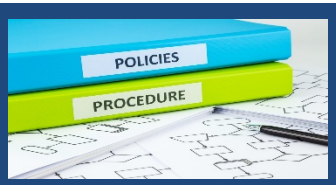
Developed AMI Technical Requirements & Organization Readiness Assessment

>16,000 ERTs

Looking Forward



Projected Timeline & Milestones



2017

RFP Funding Plan – June/July

2018 Budget Planning - July

Develop AMI Request For Proposal - Q4

Opt-out policy options - Q4

Opt-up Concepts – Q4

2018

Vendor Proposal Reviews & Contracts – Q2

Refine Opt-out policy - Q2

Refine Opt-up options – Q2

Project planning

Potential Deployment

2019

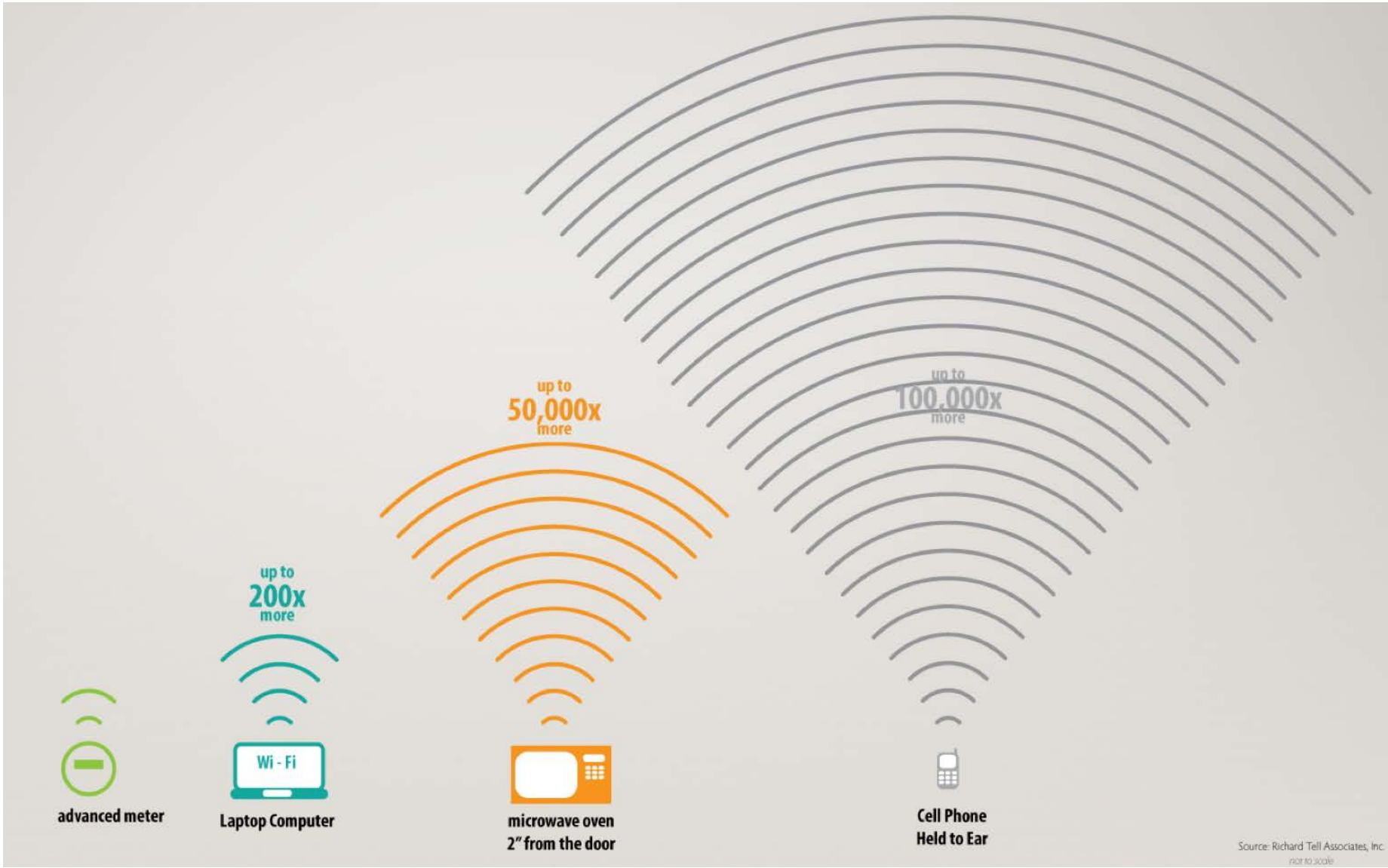
Potential Deployment

Seeking board guidance today

- [x] Ended Feasibility Study and Business Case Development Phase
- [x] Community & Stakeholder Engagement Phase
- [ ] Detailed Technical Design & Request For Proposal
- [ ] Develop Opt-Out & Opt-Up Alternatives Through the RFP

Advanced Two-way Metering

Comparison of RF Energy



Questions & Comments

Chelan County PUD Website

http://www.chelanpud.org/learning-center/advanced-meters/advance-metering-comments-and-media

American Cancer Society

https://www.cancer.org/cancer/cancer-causes/radiation-exposure/smart-meters.html

World Health Organization

http://www.who.int/peh-emf/about/WhatisEMF/en/index3.html

http://www.who.int/peh-emf/about/WhatisEMF/en/index3.html

What are electromagnetic fields?

Typical exposure levels at home and in the environment

Definitions and sources

Electric fields are created by differences in voltage: the higher the voltage, the stronger will be the resultant field. **Magnetic fields** are created when electric current flows: the greater the current, the stronger the magnetic field. An electric field will exist even when there is no current flowing. If current does flow, the strength of the magnetic field will vary with power consumption but the electric field strength will be constant.
(Extract from **Electromagnetic fields** published by the WHO Regional Office for Europe in 1999 (Local authorities, health and environment briefing pamphlet series; 32).

Natural sources of electromagnetic fields

Electromagnetic fields are present everywhere in our environment but are invisible to the human eye. Electric fields are produced by the local build-up of electric charges in the atmosphere associated with thunderstorms. The earth's magnetic field causes a compass needle to orient in a North-South direction and is used by birds and fish for navigation.

Human-made sources of electromagnetic fields

Besides natural sources the electromagnetic spectrum also includes fields generated by human-made sources: X-rays are employed to diagnose a broken limb after a sport accident. The electricity that comes out of every power socket has associated low frequency electromagnetic fields. And various kinds of higher frequency radiowaves are used to transmit information – whether via TV antennas, radio stations or mobile phone base stations.

The basics of wavelength and frequency

What makes the various forms of electromagnetic fields so different?
One of the main characteristics which defines an electromagnetic field (EMF) is its frequency or its corresponding wavelength. Fields of different frequencies interact with the body in different ways. One can imagine electromagnetic waves as series of very regular waves that travel at an enormous speed, the speed of light. The frequency simply describes the number of oscillations or cycles per second, while the term wavelength describes the distance between one wave and the next. Hence wavelength and frequency are inseparably intertwined: the higher the frequency the shorter the wavelength.

A simple analogy should help to illustrate the concept: Tie a long rope to a door handle and keep hold of the free end. Moving it up and then down slowly will generate a single big wave; more rapid motion will generate a whole series of small waves. The length of the rope remains constant, therefore, the more waves you generate (higher frequency) the smaller will be the distance between them (shorter wavelength).

What is the difference between non-ionizing electromagnetic fields and ionising radiation?
Wavelength and frequency determine another important characteristic of electromagnetic fields: Electromagnetic waves are carried by particles called quanta. Quanta of higher frequency (shorter wavelength) waves carry more energy than lower frequency (longer wavelength) fields. Some electromagnetic waves carry so much energy per quantum that they have the ability to break bonds between molecules. In the electromagnetic spectrum, gamma rays given off by radioactive materials, cosmic rays and X-rays carry this property and are called 'ionizing radiation'. Fields whose quanta are insufficient to break molecular bonds are called 'non-ionizing radiation'. Man-made sources of electromagnetic fields that form a major part of industrialized life - electricity, microwaves and radiofrequency fields – are found at the relatively long wavelength and low frequency end of the electromagnetic spectrum and their quanta are unable to break chemical bonds.

Electromagnetic fields at low frequencies

Electric fields exist whenever a positive or negative electrical charge is present. They exert forces on other charges within the field. The strength of the electric field is measured in volts per metre (V/m). Any electrical wire that is charged will produce an associated electric field. This field exists even when there is no current flowing. The higher the voltage, the stronger the electric field at a given distance from the wire.

Electric fields are strongest close to a charge or charged conductor, and their strength rapidly diminishes with distance from it. Conductors such as metal shield them very effectively. Other materials, such as building materials and trees, provide some shielding capability. Therefore, the electric fields from power lines outside the house are reduced by walls, buildings, and trees. When power lines are buried in the ground, the electric fields at the surface are hardly detectable.

Magnetic fields arise from the motion of electric charges. The strength of the magnetic field is measured in amperes per meter (A/m); more commonly in electromagnetic field research, scientists specify a related quantity, the flux density (in microtesla, μT) instead. In contrast to electric fields, a magnetic field is only produced once a device is switched on and current flows. The higher the current, the greater the strength of the magnetic field.

Like electric fields, magnetic fields are strongest close to their origin and rapidly decrease at greater distances from the source. Magnetic fields are not blocked by common materials such as the walls of buildings.

Electric fields	Magnetic fields
1. Electric fields arise from voltage. 2. Their strength is measured in Volts per metre (V/m) 3. An electric field can be present even when a device is switched off. 4. Field strength decreases with distance from the source. 5. Most building materials shield electric fields to some extent.	1. Magnetic fields arise from current flows. 2. Their strength is measured in amperes per meter (A/m). Commonly, EMF investigators use a related measure, flux density (in microtesla (μT) or millitesla (mT) instead. 3. Magnetic fields exist as soon as a device is switched on and current flows. 4. Field strength decreases with distance from the source. 5. Magnetic fields are not attenuated by most materials.

With kind permission from the National Radiological Protection Board, UK

Electric fields

Plugging a wire into an outlet creates electric fields in the air surrounding the appliance. The higher the voltage the stronger the field produced. Since the voltage can exist even when no current is flowing, the appliance does not have to be turned on for an electric field to exist in the room surrounding it.

Magnetic fields

Magnetic fields are created only when the electric current flows. Magnetic fields and electric fields then exist together in the room environment. The greater the current the stronger the magnetic field. High voltages are used for the transmission and distribution of electricity whereas relatively low voltages are used in the home. The voltages used by power transmission equipment vary little from day to day, currents through a transmission line vary with power consumption.

With kind permission from the National Radiological Protection Board, UK

Electric fields around the wire to an appliance only cease to exist when the appliance is unplugged or switched off at the wall. They will still exist around the cable behind the wall.

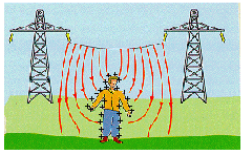
What are electromagnetic fields?

Summary of health effects

What happens when you are exposed to electromagnetic fields?

Exposure to electromagnetic fields is not a new phenomenon. However, during the 20th century, environmental exposure to man-made electromagnetic fields has been steadily increasing as growing electricity demand, ever-advancing technologies and changes in social behaviour have created more and more artificial sources. Everyone is exposed to a complex mix of weak electric and magnetic fields, both at home and at work, from the generation and transmission of electricity, domestic appliances and industrial equipment, to telecommunications and broadcasting.

Tiny electrical currents exist in the human body due to the chemical reactions that occur as part of the normal bodily functions, even in the absence of external electric fields. For example, nerves relay signals by transmitting electric impulses. Most biochemical reactions from digestion to brain activities go along with the rearrangement of charged particles. Even the heart is electrically active - an activity that your doctor can trace with the help of an electrocardiogram.



Low-frequency electric fields influence the human body just as they influence any other material made up of charged particles. When electric fields act on conductive materials, they influence the distribution of electric charges at their surface. They cause current to flow through the body to the ground.

Low-frequency magnetic fields induce circulating currents within the human body. The strength of these currents depends on the intensity of the outside magnetic field. If sufficiently large, these currents could cause stimulation of nerves and muscles or affect other biological processes.

Both electric and magnetic fields induce voltages and currents in the body but even directly beneath a high voltage transmission line, the induced currents are very small compared to thresholds for producing shock and other electrical effects.

Heating is the main biological effect of the electromagnetic fields of radiofrequency fields. In microwave ovens this fact is employed to warm up food. The levels of radiofrequency fields to which people are normally exposed are very much lower than those needed to produce significant heating. The heating effect of radiowaves forms the underlying basis for current guidelines. Scientists are also investigating the possibility that effects below the threshold level for body heating occur as a result of long-term exposure. To date, no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area.

Biological effects or health effects? What is a health hazard?

Biological effects are measurable responses to a stimulus or to a change in the environment. These changes are not necessarily harmful to your health. For example, listening to music, reading a book, eating an apple or playing tennis will produce a range of biological effects. Nevertheless, none of these activities is expected to cause health effects. The body has sophisticated mechanisms to adjust to the many and varied influences we encounter in our environment. Ongoing change forms a normal part of our lives. But, of course, the body does not possess adequate compensation mechanisms for all biological effects. Changes that are irreversible and stress the system for long periods of time may constitute a health hazard.

An adverse health effect causes detectable impairment of the health of the exposed individual or of his or her offspring; a biological effect, on the other hand, may or may not result in an adverse health effect.

It is not disputed that electromagnetic fields above certain levels can trigger biological effects. Experiments with healthy volunteers indicate that short-term exposure at the levels present in the environment or in the home do not cause any apparent detrimental effects. Exposures to higher levels that might be harmful are restricted by national and international guidelines. The current debate is centered on whether long-term low level exposure can evoke biological responses and influence people's well being.


Danger: mobile phones can 'cook' your brain

Widespread concerns for health

A look at the news headlines of recent years allows some insight into the various areas of public concern. Over the course of the past decade, numerous electromagnetic field sources have become the focus of health concerns, including power lines, microwave ovens, computer and TV screens, security devices, radars and most recently mobile phones and their base stations.

The International EMF Project

In response to growing public health concerns over possible health effects from exposure to an ever increasing number and diversity of electromagnetic field sources, in 1996 the World Health Organization (WHO) launched a large, multidisciplinary research effort. The International EMF Project brings together current knowledge and available resources of key international and national agencies and scientific institutions.

Conclusions from scientific research

In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research.

Effects on general health

Some members of the public have attributed a diffuse collection of symptoms to low levels of exposure to electromagnetic fields at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to electromagnetic fields. At least some of these health problems may be caused by noise or other factors in the environment, or by anxiety related to the presence of new technologies.

Effects on pregnancy outcome

Many different sources and exposures to electromagnetic fields in the living and working environment, including computer screens, water beds and electric blankets, radiofrequency welding machines, diathermy equipment and radar, have been evaluated by the WHO and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to electromagnetic fields, such as reports of prematurity and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures (as opposed to factors such as exposure to solvents).

Cataracts

General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. There is no evidence that these effects occur at levels experienced by the general public.

Electromagnetic fields and cancer

Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if electromagnetic fields do have an effect on cancer, then any increase in risk will be extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults.

A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields in the home. However, scientists have not generally concluded that these results indicate a cause-effect relation between exposure to the fields and disease (as opposed to artifacts in the study or effects unrelated to field exposure). In part, this conclusion has been reached because animal and laboratory studies fail to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer. Large-scale studies are currently underway in several countries and may help resolve these issues.

Electromagnetic hypersensitivity and depression

Some individuals report "hypersensitivity" to electric or magnetic fields. They ask whether aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures could be associated with electromagnetic field exposure.

There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of electromagnetic field exposure. Nor is there any accepted biological mechanism to explain hypersensitivity. Research on this subject is difficult because many other subjective responses may be involved, apart from direct effects of fields themselves. More studies are continuing on the subject.

The focus of current and future research

Much effort is currently being directed towards the study of electromagnetic fields in relation to cancer. Studies in search for possible carcinogenic (cancer-producing) effects of power frequency fields is continuing, although at a reduced level compared to that of the late 1990's.

The long-term health effects of mobile telephone use is another topic of much current research. No obvious adverse effect of exposure to low level radiofrequency fields has been discovered. However, given public concerns regarding the safety of cellular telephones, further research aims to determine whether any less obvious effects might occur at very low exposure levels.

Key points

1. A wide range of environmental influences causes biological effects. 'Biological effect' does not equal 'health hazard'. Special research is needed to identify and measure health hazards.
2. At low frequencies, external electric and magnetic fields induce small circulating currents within the body. In virtually all ordinary environments, the levels of induced currents inside the body are too small to produce obvious effects.
3. The main effect of radiofrequency electromagnetic fields is heating of body tissues.
4. There is no doubt that short-term exposure to very high levels of electromagnetic fields can be harmful to health. Current public concern focuses on possible long-term health effects caused by exposure to electromagnetic fields at levels below those required to trigger acute biological responses.
5. WHO's International EMF Project was launched to provide scientifically sound and objective answers to public concerns about possible hazards of low level electromagnetic fields.
6. Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.
7. The focus of international research is the investigation of possible links between cancer and electromagnetic fields, at power line and radiofrequencies.

Progress in research

If electromagnetic fields constitute a health hazard, there will be consequences in all industrialized countries. The public demands concrete answers to the ever more pressing question, whether everyday electromagnetic fields cause adverse health effects. The media often seem to have definitive answers. However, one should judge these reports with caution and take into account that the primary interest of the media is not education. A journalist may select and report a story driven by a range of non-technical reasons: journalists compete with one another for time and space and different journals and newspapers compete for circulation numbers. Novel sensational headlines that are relevant to as many people as possible aid them in achieving these goals - bad news is not only the big news, it is often the only news we hear. The large number of studies which suggest that electromagnetic fields are harmless receive little if any coverage. Science cannot provide a guarantee of absolute safety yet but the development of research is reassuring overall.

Different types of studies are needed

as well it could mean that the effect is simply undetectable with our method of measurement. Therefore, negative results are generally less convincing than strong positive ones.

The most difficult situation of all, which unfortunately has developed with epidemiology studies involving electromagnetic fields, is a collection of studies with weak positive results, which however are inconsistent among each other. In that situation, scientists themselves are likely to be divided about the significance of the data. However, for the reasons explained above, most scientists and clinicians agree that any health effects of low level electromagnetic fields, if they exist at all, are likely to be very small compared to other health risks that people face in everyday life.

What's in the future?

The main aim of WHO's International EMF Project is to initiate and co-ordinate research worldwide to produce a well-founded response to public concerns. This evaluation will integrate results from cellular, animal and human health studies to allow as comprehensive a health risk assessment as possible. A holistic assessment of a variety of relevant and reliable studies will provide the most reliable answer possible about the adverse health effects, if any exist, of long term exposure to weak electromagnetic fields.

One way to illustrate the necessity of evidence from different types of experiments is a crossword. To be able to read the given crossword's solution with absolute **CERTAINTY** nine questions must be answered. Assuming we can only answer three of these, we might be able to guess the solution. However, the three given letters may also be part of a very different word. Every additional answer will increase our own confidence. In fact, science will probably never be able to answer all questions, but the more solid evidence we collect the better will be our guess at the solution.

											C	E	L	L	U	L	A	R
			E	X	P	O	S	U	R	E								
					D	O	S	E	-	R	E	S	P	O	N	S	E	
								S	T	A	T	I	S	T	I	C	S	
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										A	N	I	M	A	L			
									P	A	T	H	O	L	O	G	Y	
E	P	I	D	E	M	I	O	L	O	G	Y							

Key points

- Laboratory studies on cells aim to determine if there is a mechanism by which electromagnetic field exposure could cause harmful biological effects. Animal studies are essential for establishing effects in higher organisms whose physiology resembles that of humans to a degree. Epidemiological studies look for statistical associations between field exposure and the incidence of specific adverse health outcomes in humans.
- Finding a statistical association between some agent and a specific disease does not mean that the agent caused the disease.
- The absence of health effects could mean that there really are none; however, it could also signify that an existing effect is undetectable with present methods.
- Results of diverse studies (cellular, animal, and epidemiology) must be considered together before drawing conclusions about possible health risks of a suspected environmental hazard. Consistent evidence from these very different types of studies increases the degree of certainty about a true effect

Current standards

Standards are set to protect our health and are well known for many food additives, for concentrations of chemicals in water or air pollutants. Similarly, field standards exist to limit overexposure to electromagnetic field levels present in our environment.

Who decides on guidelines?

Countries set their own national standards for exposure to electromagnetic fields. However, the majority of these national standards draw on the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This non-governmental organization, formally recognized by WHO, evaluates scientific results from all over the world. Based on an in-depth review of the literature, ICNIRP produces guidelines recommending limits on exposure. These guidelines are reviewed periodically and updated if necessary.

Electromagnetic field levels vary with frequency in a complex way. Listing every value in every standard and at every frequency would be difficult to understand. The table below is a summary of the exposure guidelines for the three areas that have become the focus of public concern: electricity in the home, mobile phone base stations and microwave ovens. These guidelines were last updated in April 1998.

Summary of the ICNIRP exposure guidelines

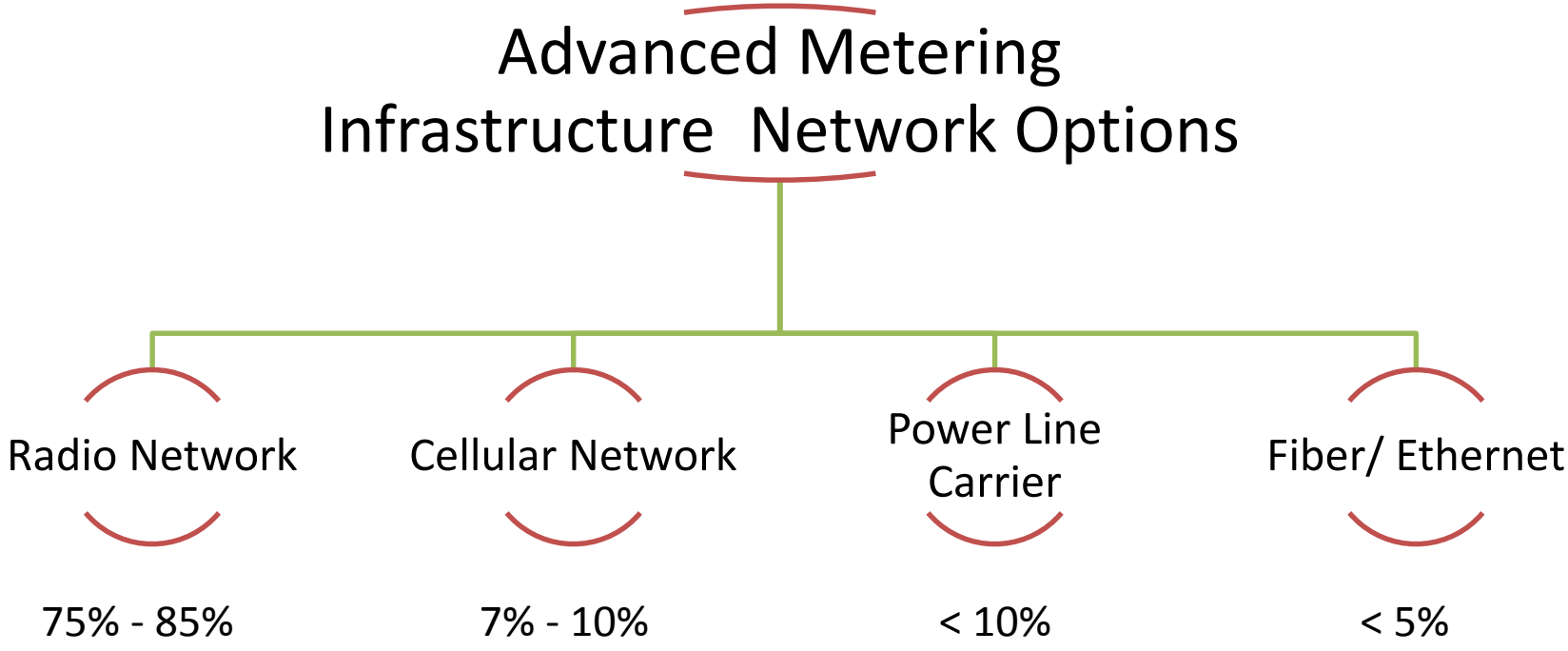
Seeking Board Approval

- [x] Staff has provided sufficient evidence through the business case issued on January 10, 2017, that Advanced Metering Infrastructure will save operating costs and bring direct value to our customers in the way of an energy management system.

- [x] Staff has performed substantial community and customer outreach through April and May 2017, providing factual information about the AMI technology and the intended use by the District. Staff listened to community members and provided reasonable responses through various mediums.

- [ ] Approve staff to move into the budgeting process for the AMI project, execute the development of a 90% design, and create an associated request for proposal (RFP) to be reviewed by the Board of Commission prior to issuing to the vendors.

Market Trends For AMI Networks



Community Feedback

- Broad support for the project & technology
  - Customers see value in outage notification, consumption data & remote reads
  - Reducing PUD's carbon footprint & operating costs is highly valued
  - Business community & electricians strongly favor the technology

- Opposition does exist
  - RF health impacts, data privacy & network security remain the top concerns
  - Those opposing strongly value opt-out policy
  - Some expressed concerns about advanced two-way meters causing home fires
  - PUD outreach team captured questions & concerns

Advanced Two-way Metering

Community Outreach

Concerns & Clarifications

Advanced Two-Way Metering

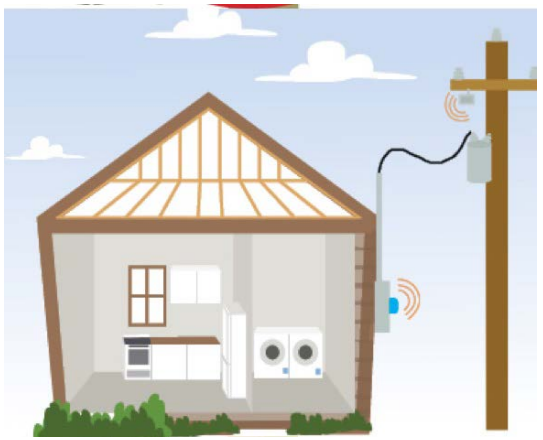
Community Outreach Concern

Concern

PUD IS INSTALLING "SMART METERS" TO SPY ON OUR ENERGY USE

Clarification

- PUD is installing Advanced Two-Way meters *
- Some "Smart Meters" are equipped with a device to communicate with a network of appliances within your home- NOT OUR RESIDENTIAL METERS
- PUD's proposed advanced meters only communicate between the meter and the utility operations center through a secure network
- Only information such as hourly energy consumption and power quality will be sent



** Commercial & Industrial meters generally can offer more advanced data acquisition functionality which can include communication supporting control systems, demand response and distribution automation capabilities*

Advanced Two-way Metering

Community Outreach Concern

Concern

PUD WILL RAISE RATES TO PAY
FOR THIS PROJECT – WHAT WILL METERS COST

Clarification

- Project allows the utility to run more efficiently reducing pressure on the need to implement future rate increases
- Project has a “positive return on investment” and if implemented, should save the utility money
- There is no cost to the customer for meter and installation

Advanced Two-way Metering

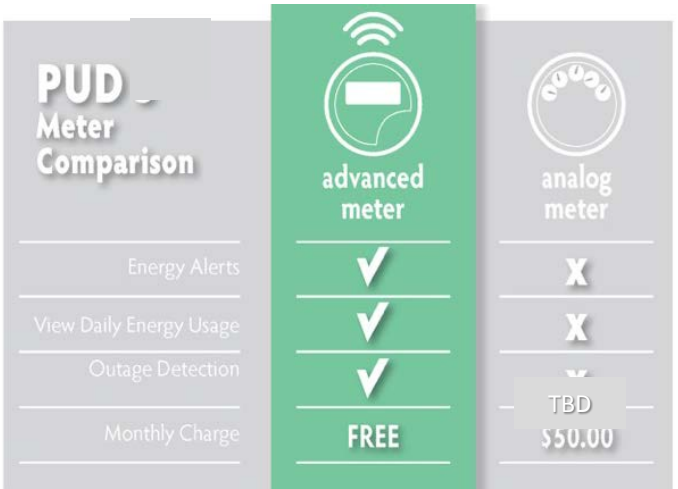
Community Outreach Concern

Concern

CUSTOMERS DO NOT HAVE A CHOICE ABOUT AN ADVANCED METER

Clarification

- Today, all meters are planned for replacement
- ~ 16K existing residential meters have one-way RF output for monthly reading purposes
- Customers may voluntarily choose to opt-out of having an advanced two-way meter on their home.*



** Opt-out policies generally include a monthly charge based on the number of participants and operating costs to maintain traditional meter reads.*

Advanced Two-way Metering

Community Outreach Concern

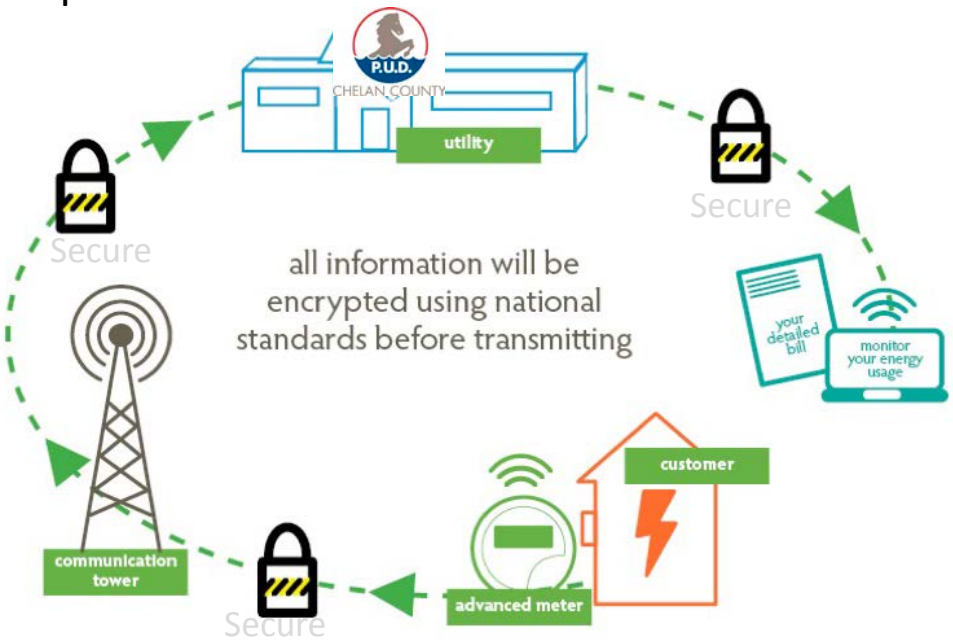
P.U.D. CHELAN COUNTY

Concern

CUSTOMER & ENERGY USE DATA IS UNSECURE

Clarification

- Customer information (e.g. name, address, account number) is not stored within the meter, or sent through the wireless RF network
- All meter reading data is encrypted with multiple layers of protection and transmitted back to the PUD's operation center
- PUD can NOT see beyond the meter on customers energy usage



Advanced Two-way Metering

Community Outreach Concern

Concern

ADVANCED METERS CAUSE FIRES

Clarification

- Meter fires are normally caused by faulty meter bases or loose wiring
- Fires can occur with an analog meter, digital meter or advanced meter
- Highly skilled/trained employees inspect meter bases and install meters
- If a faulty meter base is discovered during meter replacement, the PUD will work with the customer to make the appropriate improvements
- Advance Meter deployment is an opportunity to inspect, identify, and repair these conditions.

Advanced Two-way Metering

Community Outreach Concern

Concern

LOSS OF METER READER JOBS

Clarification

- Since 2007, the District has reduced from 13 full-time meter readers to 2
- A contract has been in place to provide temporary meter readers
- As we deploy advanced meters we will reduce the reliance on contractors
- Once fully deployed we will no longer need contract meter readers

Concern

Clarification

ADVANCED METER RADIO FREQUENCY (RF) IS HARMFUL TO MY HEALTH

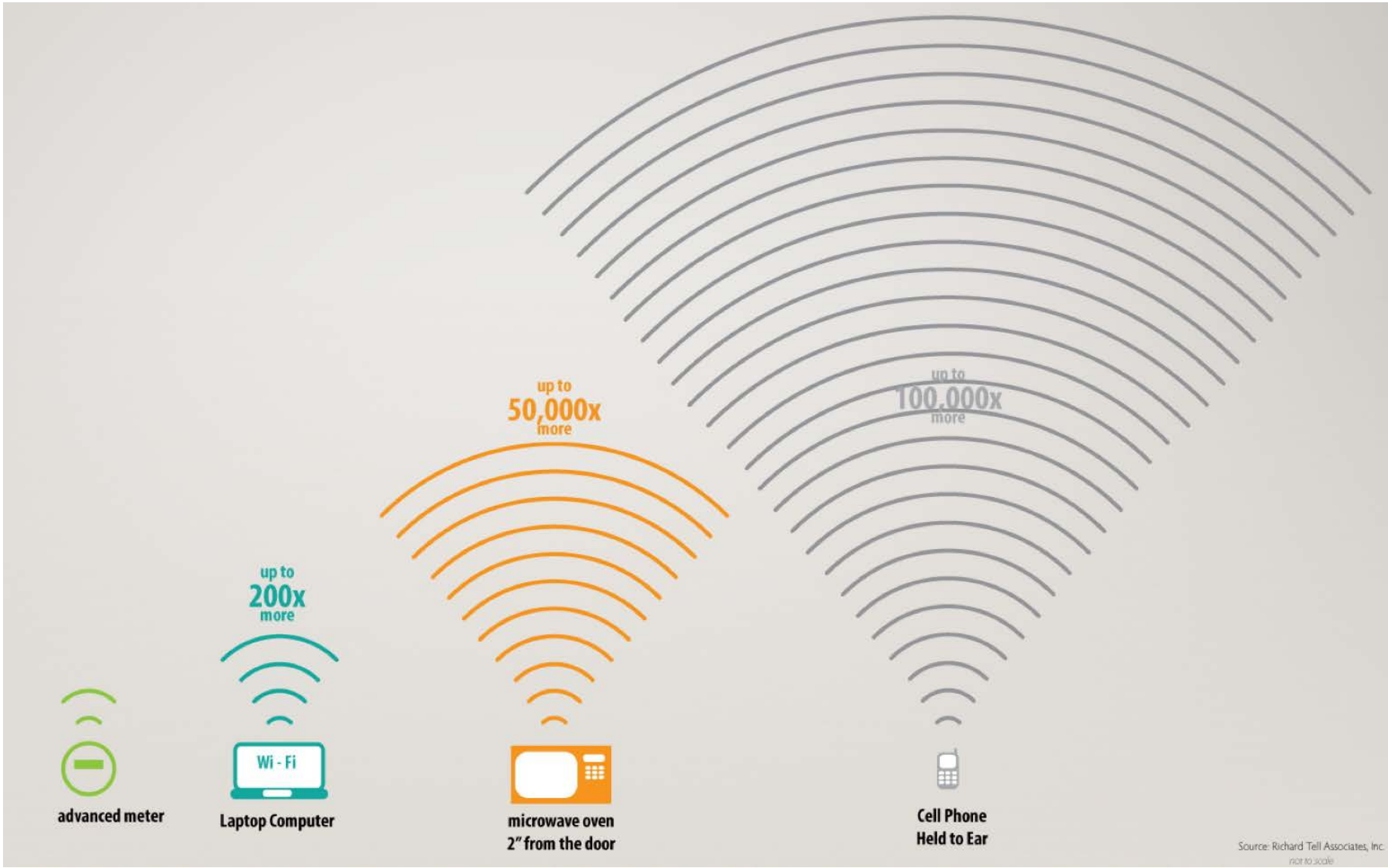
- It is a common practice to equate cell phone emissions to advanced meter emissions
- American Cancer Society quotes[1]: *"Because the amount of RF radiation you could be exposed to from smart meter is much less than what you could be exposed to from a cell phone, it is very unlikely that living in a house with a smart meter increases risk of cancer"*

  Dr. Peter Valberg quotes[2]: *"15 minutes of cell phone usage ~ = 375 years of advanced meter exposure"*
- The Federal Communications Commission (FCC) in conjunction with the American National Standards Institute (ANSI) and the National Council on Radiation Protection and Measurements (NCRP) have established rules to protect workers and the general public from known RF hazards. The FCC rules establish limits for emissions from devices and exposures to the population.
- Two-way meter data exchange can be in bursts less than two minutes total per day[3]

Sources:
(1) American Cancer Society (www.cancer.org)
(2) Testimony from Dr. Peter A. Valberg before the Public Service Commission Maryland 2012,
(3) Utiliworks Consulting LLC

Advanced Two-way Metering

Comparison of RF Energy



Community Outreach Summary

Questions?

www.chelanpud.org/advancedmeters

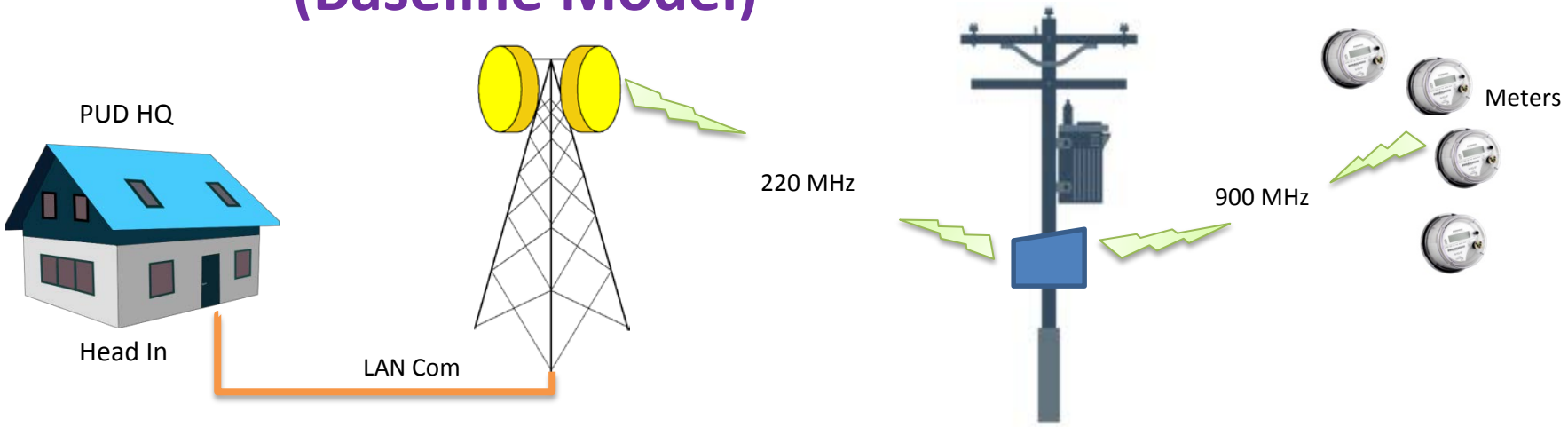
Advanced Two-way Metering

NEXT STEPS

- Report and check-in on 5/15 for any further Board questions
- 6/5 Seek Commission approval for advanced two-way metering
- If approved, Staff to begin updating the Customer Utilities 2018 – 2022 business plan to include the implementation of advanced two-way metering including:
    - Detailed System Design
    - RFP Development
    - Budgeting & Forecasting
    - Project Timeline

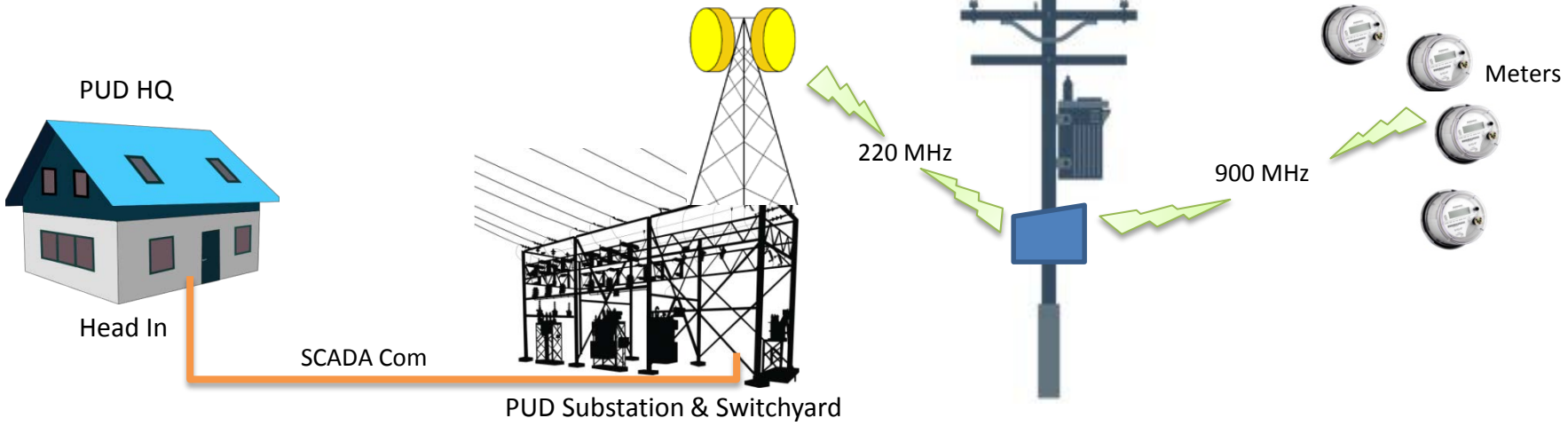
Alternative 1 Two-Way Communication Path (RF)

(Baseline Model)



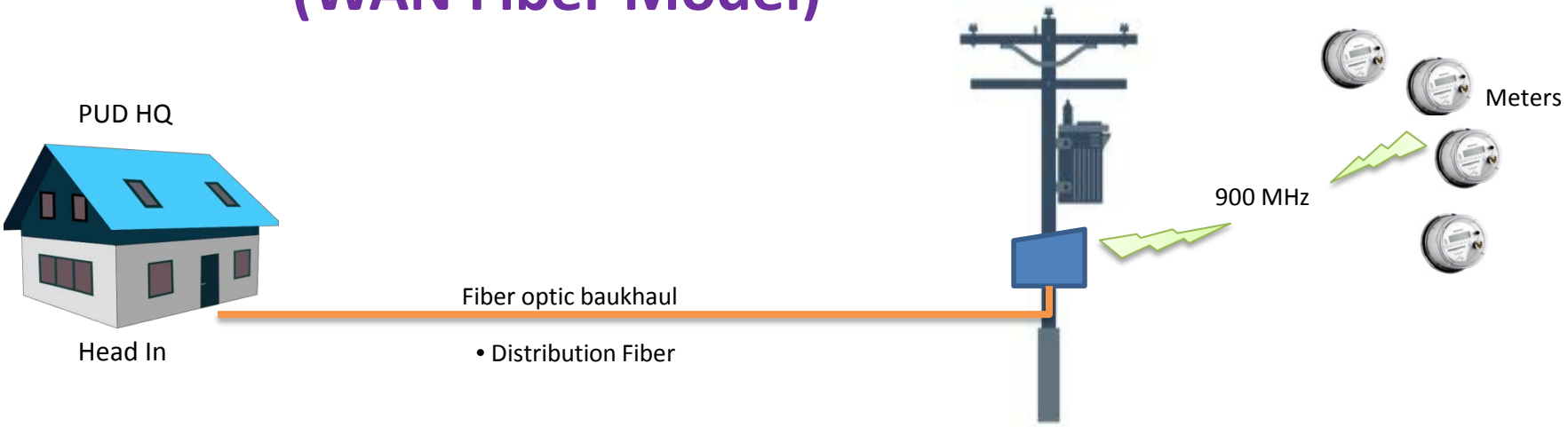
Alternative 2 Two-Way Communication Path (RF w/Fiber Backhaul Substation SCADA)

(Typical Tantalus Model)



Alternative 3 Two-Way Communication Path (Limited RF & Distribution Fiber Optic)

(WAN Fiber Model)



Alternative 4 Two-Way Communication Path (Fiber Optic w/ limited RF)

(Chattanooga Model)