

FEBRUARY 2012 –

Smart Meters

What are smart meters?

Vermont electric utilities are working to install advanced metering technology known as “smart meters”. Smart meters are devices that use radio signals to communicate electricity demand through mobile telecommunications. The signals that are used – radio frequency radiation or RFR – are the same as those that have been used for radio and TV broadcasting for many years. Microwave ovens, radar and wi-fi devices also emit RFR, but today mobile phones are the most common source of exposure to RFR.

What is radio frequency radiation (RFR)?

Radio frequency energy or radiation is a form of electromagnetic radiation. There are two types of electromagnetic radiation: ionizing (e.g. x-rays, radon, and cosmic rays) and non-ionizing (e.g. radio frequency radiation or RFR and extremely low frequency or power frequency).

How does RFR affect the body?

Exposure to ionizing radiation, such as from radiation therapy, is known to increase the risk of cancer. However, although many studies have examined the potential health effects of non-ionizing radiation from radar, microwave ovens and other common sources such as mobile phones, at this time there is no consistent evidence that non-ionizing radiation increases a person’s risk of cancer.

The only known biological effect of radio frequency radiation is heating. The ability of microwave ovens to heat food is one example of this effect of radio frequency energy. Radio frequency exposure from cell phone use does cause heating; however, it is not sufficient to measurably increase body temperature.

Source: National Cancer Institute at the National Institutes of Health

What do we know about health effects from smart meters?

There is little scientific evidence specific to smart meters. However RFR from smart meters and mobile telephones are nearly identical, so investigations on potential health effects from mobile phones can be used to estimate potential health effects from smart meters.

One important difference between exposure from smart meters and mobile phones is the physical arrangement of exposure. While a mobile phone exposes the user’s eyes, skull and brain with a transmitting antenna in close proximity, smart meters are fixed sources attached to the outside of buildings. This should make comparisons to the health effects research findings from mobile phones a worst-case scenario.

How do smart meters compare to mobile phones in terms of RFR emissions?

Smart meters, according to both mathematical modeling and field tests, emit RFR at very low levels, lower than mobile telephones. In January 2012, the Vermont Department of Health made actual measurements at active smart meters installed by Green Mountain Power in Colchester. The readings from these devices verify that they emit no more than a small fraction of the RFR emitted from a wireless telephone, even at very close proximity to the meter, and well below regulatory limits set by the Federal Communications Commission (FCC).

How does RFR from smart meters compare to regulatory standards?

The FCC establishes maximum permissible exposure limits to prevent thermal effects of RFR using units of power density: watts per square meter (W/m^2), milliwatts per square centimeter (mW/cm^2), or microwatts per square centimeter ($\mu W/cm^2$).

Measurements taken directly in contact with a smart meter on the exterior wall of a residence in Colchester, Vermont ranged from 50 to $140 \mu W/cm^2$ compared to the FCC's maximum permissible exposure limit of $610 \mu W/cm^2$ for a member of the public. Measurements at a distance of three feet or more from the smart meter were at or near background. A mobile phone used at this location and time was also measured using the same instrument. Transmission of RFR from the phone at the time of measurement was $490 \mu W/cm^2$.

What does the Health Department conclude about health effects of smart meters?

The current health protection standards established for mobile telephones in the U.S. and in most other countries around the world are generally accepted as sufficient to prevent health effects from smart meters.

After extensive review of the scientific literature available to date and current FCC regulatory health protection standards, the Health Department agrees with the opinion of experts:

- The thermal effects of RFR are well understood, and are the current basis for regulatory exposure limits. These limits are sufficient to prevent thermal health effects.
- Non-thermal health effects have been widely studied, but are still theoretical and have not been recognized by experts as a basis for changing regulatory exposure limits.

The Health Department has concluded that the current regulatory standards for RFR from smart meters are sufficient to protect public health.

For the full public health assessment on Radio Frequency Radiation & Health: Smart Meters, go to the Health Department's website: <http://healthvermont.gov/pubs/Publications.aspx>