FCC Rules of operation for smart meters, an FCC part 15 class B digital device, Title 47 CFR 15, unlicensed spectrum operating in the free wifi range of 900 Mhz and 2.4 GHz (CFR - Code of Federal Regulations)

1. ***The operation of the switch mode power supply (SMPS) inside the smart meter causes incidental noise, which is the technical term for dirty electricity or high frequency transients. Incidental noise is defined in FCC rules in the Code of Federal Regulation or 47 CFR 15.3(n) here and here:***
2. ***Definitions needed to understand these FCC rules:***
    a) ***Incidental radiator****(n):* A device that generates radio frequency energy during the course of its operation although the device is not intentionally designed to generate or emit radio frequency energy. Examples of incidental radiators are dc motors, mechanical light switches, etc.
    b) ***Harmful interference*** (m): Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this chapter.
3. ***Smart meters are an FCC part 15 Class B device that operates under the rules of 47 CFR 15.5 which states:***
    a) **Two rules of operation**. Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that **no harmful interference is caused and** that **interference must be accepted** that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.
    b) **Harmful interference must be remedied or operations stopped.** If there is harmful interference the user must stop operation and remedy the interference. The operator of a radio frequency device **shall be required to cease operating the device** upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected
4. Manufacturers and importers should use good engineering practices (GEP) before they market and sell these products, to minimize possible interference (47 CFR 15.13).
    a) What are good engineering practices that should have been built into the smart meter design and which parts were overlooked or omitted of any review after finding they were problematic?

Good engineering practices or GEP in the Power Industry

Power Industry smart meters lack " Safety by Design" : Here is what IEEE recommends for GEP

In addition to overcurrent and disconnecting means requirements of the National Electrical Code (NEC), 13 articles 230 and 240, or local codes, **facility services should be protected against electrical anomalies** that may result from impacts to the electric utility's distribution or transmission system. These may include but are not limited to:

1. **Motor control and protection**: Utility tariffs usually state that they assume no responsibility for failures, equipment, or operations due to use of the electrical energy. The utility requirements specify **that customers are responsible for equipping motor controllers with protection.**
2. **Undervoltage protection**: Tripping devices to prevent sustained under-voltage operation. The under-voltage protection should be of a time delay type to avoid unnecessary tripping during momentary disturbances or service interruptions.
3. **Phase protection**: Tripping devices to switch off motor controllers as protection from single phasing, improper rotation due to phasing, and overheating due to current unbalance.
4. **Arc Flash and or other protection that enhances maintenance and operational safety:** Protection to mitigate electrical hazards may be more than that required to meet the minimum requirement of installation codes, how it should be considered within the context of **safety-by-design** principles and the hierarchy of hazard control measures provided in NFPA 70E and ANSI Z10.

GEP in the Pharmaceutical Industry, another example, all companies use it

https://www.bing.com/search?q=good%20engineering%20practices&qs=ds&form=ATCVAJ

Pharmaceutical business **Good Engineering Practices (GEP)** encompass a set of principles, methodologies, and guidelines that serve as a foundation for ensuring quality, safety, and efficiency in engineering processes across various industries[1][2]. These practices are essential for maintaining consistency, reliability, and compliance in engineering efforts. Here are some key aspects of good engineering practices:

1. **Meticulous Documentation**: Accurate and comprehensive documentation is crucial. Engineers should record design decisions, calculations, test results, and any modifications made during the project. Clear documentation ensures transparency, facilitates collaboration, and aids troubleshooting.
2. **Risk Management**: Identifying and managing risks is fundamental. Engineers should assess potential hazards, evaluate their impact, and implement mitigation strategies. Regular risk assessments help prevent accidents, reduce downtime, and enhance safety.
3. **Continuous Training**: Staying updated with industry advancements and best practices is essential. Engineers should participate in training programs, workshops, and conferences. Continuous learning ensures proficiency and adaptability.
4. **Commitment to Safety**: **Safety should be a top priority**. Engineers must adhere to safety protocols, use appropriate protective gear, and follow established safety guidelines. A safety-conscious approach prevents accidents and protects personnel.
5. **Cost Management**: Efficient resource utilization is critical. Engineers should optimize costs without compromising quality. Balancing budget constraints with project

requirements ensures cost-effective solutions. [**Left out the cost to the customer to protect their equipment and health!!!]**

6. **Innovation and Continual Improvement**: Encouraging innovation drives progress. Engineers should explore new technologies, methodologies, and tools. Regularly evaluating processes and seeking improvements leads to better outcomes.
7. **System Lifecycle Approach**: Considering the entire lifecycle of a system or product is essential. Engineers should address design, development, testing, maintenance, and decommissioning phases. A holistic view ensures long-term success.
   Remember that good engineering practices are not static; they evolve with advancements and industry standards. By following these practices, industrial professionals enhance operational efficiency, mitigate risks, and achieve sustainable success[34].

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Dirty Electricity Link Info:

Additional Info on Dirty Electricity (DE)- how to mitigate it and the expenses incurred for someone who is EHS here: https://defiltersllc.com/?v=93b46a3fc67d

https://interferencetechnology.com/identifying-and-locating-radio-frequency-interference-rfi/

RADIO FREQUENCY INTERFERENCE BEST PRACTICES GUIDEBOOK Feb 2020 CISA and NCWSIC/SAFECOM

The rest of this summary is very specific RF interference GEP to resolve it using the 5R's

1. Recognize
2. Respond
3. Report
4. Resolve
5. Resilience

Table 1. Internal RF Interference Examples

Internal RF Interference Examples	
Equipment problem	Interruptions may be caused by new installations of or updates to communications technologies. For example, updates to physical infrastructure (e.g., new additions to a tower or relocation of a receiver), as well as upgrades of radio consoles or hubs may cause this kind of internal interference.
Receiver intermodulation	Interruptions may be caused by "non-linear mixing" of external signals inside the receiver.[9] Users will usually hear multiple wireless signal emissions at the same time.
Front-end overload	Interruptions may be caused by inadequate filtering of radio equipment, or equipment that needs adjustment.

There are many commercially available training opportunities to expand knowledge of RF Interference Mitigation (RFIM) best practices, as well as courses on RF interference identification and how to use a spectrum analyzer. One example is the International Certification Accreditation Council (ICAC) which offers several accredited training courses and certificate programs related to RFIM. [36] Gaining competency and certification on RFIM enables public safety technicians to quickly identify, mitigate, and

RF Interference Mitigation Lifecycle

The RF interference mitigation cycle includes five steps: Recognize, Respond, Report, Resolve, and Resilience. In order to robustly defend against RF interference, public safety organizations must employ these steps continuously. It is also recommended that organizations consider sharing information on RF interference with neighboring jurisdictions to further increase resiliency.

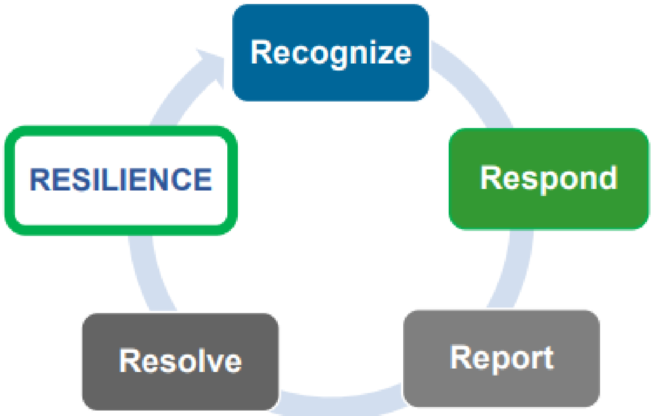

Figure 2. RF Interference Mitigation Lifecycle

Recognize

Figure 3. How to Mitigate RF Interference - Recognize

Although public safety agencies may attribute equipment failure to normal wear or general malfunctioning, disruptions in communications may result from internal or external RF interference. Per the above figure from S&T,[40] identifying the source of the RF interference is a crucial step to mitigating issues and regaining communications capabilities.