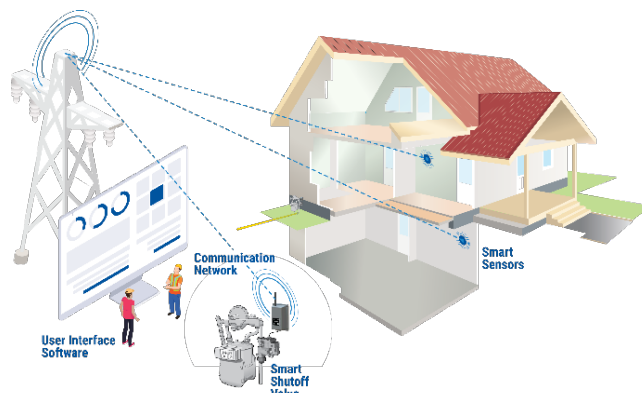
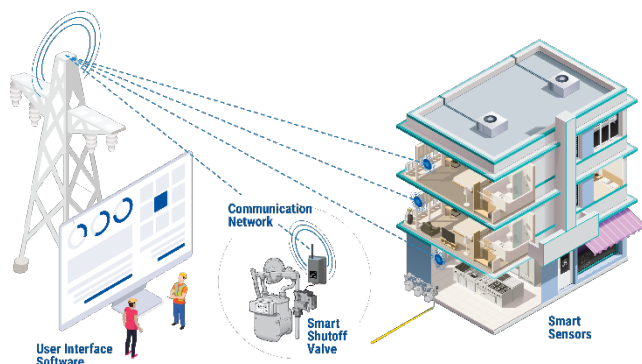


Smart Shutoff Safety System for Commercial and Residential Buildings



Project Goal

GTI Energy led a project to research, test, develop, and implement a comprehensive gas smart shutoff safety system (CGSSSS) for residential and commercial gas customers to help reduce risks from leaks and other natural disasters. The safety system is comprised of four major components: smart sensors, smart shutoff valve, a communication network, and user-interface software. Funding for the project was provided by the California Energy Commission (CEC) and Operations Technology Development (OTD).

Smart sensors detect abnormal concentrations of gas (gas leak) or temperatures (fire) and communicate the hazard readings to the gas utility and/or emergency responders. Depending on the readings from these smart sensors, the gas smart valve can be actuated remotely or be programmed to close if hazardous gas concentrations or temperatures are detected. The closure of the smart gas valve will stop the flow of gas and reduce the threat of a potential fire and/or explosion in a building.

Market Challenge

Gas leaks and fires/explosions in buildings are a major concern in the gas industry. All gas leaks can impact life, property and the overall environment, and efforts are needed to identify these leaks prior to them becoming hazardous, send alerts of these leaks to first responders, and

stop the gas from being further emitted into the environment. This project presents new smart technology that can be implemented now to address these concerns and support the nation's clean energy and climate goals.

While commercial stand-alone safety devices are available, they do not possess connectivity to automate the safety response among emergency personnel, gas customers, and gas utility companies.

Research

GTI Energy initiated a market research study with residential and commercial natural gas customers on needs and preferences to help build the overall strategy for improved adoption. These efforts were followed by the identification, evaluation, and demonstration of various smart shutoff devices coupled together to form a smart shutoff safety system.

Two demonstration systems were developed around different vendors and served as proof of concept. One system featured a smart shutoff valve, the Lorax Systems Meter Valve MV-32IH, and the other system centered on a smart gas meter with built-in shutoff valve, the Honeywell American Meter AC-250NX. Both systems incorporated smart hazard sensor types, the New Cosmos indoor gas detector and a GlobalSat fire alarm, and the LoRaWAN wireless communication network.

The prototypes were tested in a Pacific Gas and Electric Company simulated building environment. The system was then deployed in actual commercial and residential buildings.

Conclusions

The project successfully demonstrated the smart shutoff safety system in residential and commercial buildings, exhibiting desired behaviors and confirming their intended functionality. All components of the smart safety shutoff system have been improved as a result of this project and are commercially available. The benefits of such a safety system include decreased methane emissions, prevention of customer property damage and personal injury in the event of a hazard, and a decrease in incidents caused by gas leaks.

The final report can be found on the CEC website at <https://www.energy.ca.gov/publications/2024/smart-shutoff-technology-commercial-and-residential-buildings>.

Partners



GTI ENERGY

GTI Energy, a technology development and training organization, led the project.

Our trusted team works to scale impactful solutions that shape energy transitions by leveraging gases, liquids, infrastructure, and efficiency. We embrace systems thinking, innovation, and collaboration to develop, scale, and deploy the technologies needed for low-emission, low-cost, and resilient energy systems. www.gti.energy



Operations Technology Development (OTD), a member-controlled collaborative that improves safety, reliability, and

operational efficiency of gas systems through innovative R&D projects. OTD provided subject matter expertise, direction, and funding for the project. www.otd.org



New Cosmos is the manufacturer and distributor of the DeNova Detect Remote Methane Detector (RMD) that provides methane concentration level data via the LoRaWAN network and alarms when the level meets or exceeds 10% LEL (lower explosive limit). www.denovadetect.com



Lorax is the manufacturer of the gas "stand alone" LoRaWAN® and cellular-based smart shutoff valve and user interface software.

www.loraxsystems.com

Honeywell **Honeywell** is the manufacturer of the LoRaWAN® smart meter with integrated shutoff valve and user interface software. www.honeywell.com/us/en

netmore **Netmore** is the LoRaWAN® Wireless Communication Network operator selected for the project. Research conducted during the project indicated that this wireless communication network can provide long battery life, deep signal penetration, and overall better performance for wireless smart sensors as compared to existing communication networks traditionally used by utilities.

www.netmoregroup.com



Semtech Corporation is the silicon chip maker for the LoRaWAN® Wireless

Communication Network. They created a prototype LoRaWAN® microchip for the smart sensors and smart valves used as part of this project. www.semtech.com

For More Information

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