

OPPORTUNITY

How much energy use comes from natural gas?

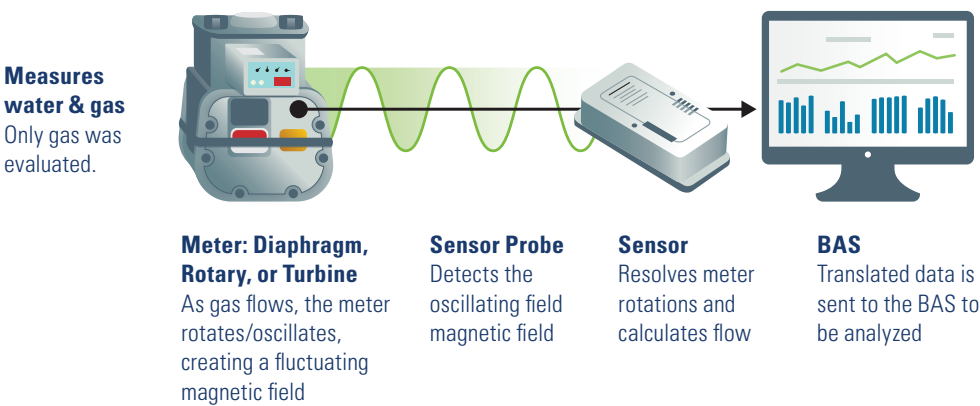
30%

OF ENERGY USE IN THE U.S. COMES FROM NATURAL GAS<sup>1</sup>  
The global warming potential of leaked natural gas is 34x worse than CO<sub>2</sub> emissions<sup>2</sup>

TECHNOLOGY

How does the non-invasive submeter work?

Straps on to any existing utility meter to measure real-time, high-resolution data. Integrated into BAS for improved visibility.



M&V

Where did Measurement and Verification occur?

**NATIONAL RENEWABLE ENERGY LABORATORY (NREL)** assessed the impact of a non-invasive gas submeter provided by Vata Verks at two testbeds in Dallas, Texas: the A. Maceo Smith and Terminal Annex Federal Buildings.

RESULTS

How did the non-invasive gas submeter perform in M&V?

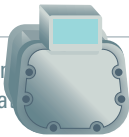

**99% ACCURATE**  
COMPARED TO UTILITY METER<sup>3</sup>  
Largest difference in accuracy was 2%

**QUICK INSTALLATION**  
NO PIPE-CUTTING<sup>4</sup>  
On-site cabling and mounting took 1 day. BAS integration took a few days.

**70% – 90% LESS EXPENSIVE**  
THAN INCUMBENT<sup>5</sup>  
\$3,000: \$750 equipment, \$2,350 installation versus \$10,000 to \$30,000 for previous GSA submeter installations

Lessons Learned

GSA staff plan to install the gas submeter at additional facilities using the following best practices

Select the ultra-high resolution submeter option	For a cost difference of 10%, you get additional functionality, including minimum, maximum, and instantaneous flow readings and higher resolution data than other meters. 
Select an integration method: JACE or network switch	Integration is simpler with a JACE but available ports may be limited. The network switch requires additional permissions to communicate on the GSA network.
Install when gas is being consumed	Calibrating during winter months is more accurate, especially for compensated gas meters. The vendor keeps a library of gas meter k-factors, which can streamline calibration. 
Work with a single contractor and install in an enclosure	Work with the same contractor to run cabling and install an electrical outlet. The enclosure should include a dedicated electrical outlet to energize the device.
Allow for k-factor adjustment within the BAS wire sheet	Updates can then be made in the BAS, instead of physically connecting to the submeter. Non-GSA sites can remote into the device using Telnet or a web server.
Work with the BAS subcontractor for integration	Contracting BAS integration as part of normally scheduled duties will streamline the process and reduce costs.
Use terminal emulators	Terminal emulators such as Terra Term or PuTTY are needed to configure the submeter.

DEPLOYMENT

Where does M&V recommend deploying non-invasive submeters?

SUPPORTS POLICY/REPORTING GOALS

Including requirements for the Energy Independence and Security Act.<sup>6</sup> Best suited to buildings that have an integrated BAS and whole-building or equipment-specific meters.  
Submeter also measures water flow, though this functionality was not tested.

<sup>1</sup>September 2020 Report: U.S. Oil and Natural Gas: Providing Energy Security and Supporting Our Quality of Life, U.S. DOE <sup>2</sup>United Nations Climate Change, Why Methane Matters, 7 August 2014 <sup>3</sup>Sean Pachuta, Demonstration and Evaluation of a Non-Invasive, Low-Cost, Strap-On Sensor For Natural Gas Meters. NREL, November 2022, p.5 <sup>4</sup>Ibid, p.6 <sup>5</sup>Ibid, p.7 <sup>6</sup>Energy Independence and Security Act of 2007, U.S. DOE, Alternative Fuels Data Center