

Natural Gas Submeters



Introduction

A natural gas submeter is a gas meter installed downstream of the main utility or billing meter. Gas meters measure the volume of gas that flows through the meter, typically measured in cubic feet. A submeter can be used to zero-in on energy usage of particular interest. On a farm, a submeter can be installed to measure energy directly consumed in a building or by a piece of equipment.

Natural gas is a compressible fluid; its density is determined by temperature, pressure and gas composition. All new meters will be temperature compensated. In order to accurately meter the energy used, corrections need to be made to the volume the gas meter measures. These are typically done by the natural gas supplier. If a submeter is installed, then the following factors need to be considered to determine the amount of energy used, typically measured in gigajoules (GJ).

Energy Calculation

To determine the energy used at the meter:

$$\text{Energy (GJ)} = \text{HV} \times \text{CF} \times \text{PF} \times \text{Volume}$$

Composition or Heat Value (HV):

This conversion factor will be found on your bill and may change month to month.

Unit Conversion Factor (CF):

The meter will measure the cubic feet of gas used. This factor converts the measurement from cubic feet of natural gas to gigajoules (energy). This value will always be 0.0282624.

Pressure Factor (PF):

This factor is elevation and pressure specific. The billing submeter may not have the same pressure through it as the submeter, therefore it is important to know the pressure through the submeter. To find the submeter pressure, look for the first regulator upstream of the submeter. Typically, there will be a 5, 20, or up to 40 psi regulator before the billing meter and a 0.25 psi (4 oz.) regulator into a building. You should be able to read the pressure off the regulator cap. Next determine the elevation of your location; a good online tool is www.WhatIsMyElevation.com. Once the pressure and elevation are known, use the following online tool to determine the pressure factor: https://submetersolutions.com/pressure_factor.htm.

Volume:

This is the volume, measured in cubic feet, read off the installed submeter. It is recommended to read the meter on the same day each month as your bill.

NATURAL GAS COMPANY
November 1, 2017

INVOICE #1234

Customer Your Name	Rate class Farm	
Customer ID# 12345 6789	Pressure Factor 2.26	This value is specific for this location and 20 psi at the meter. Do not use if the submeter has a different pressure.
Address Red Deer Alberta, Canada	Unit Conversion 0.0282624	This value will always be 0.0282624 which converts cubic feet to GJ.
Payment Due Due Date	Heat Value 39.55	Need this heat value for the calculation.
Amount Due \$5,291.50	Utility Multiplier 1.000	
	Profile Multiplier 1.000	This is all the multipliers combined. This will be different for the submeter if it has a different pressure.

From	To	Start (ft ³)	End	Difference	Multiplier	Units Billed
10/01/17	10/31/17	45,678 ft ³	46,890 ft ³	1,212 ft ³	2.5262	3,061 GJ

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Example

Consider a farm near Red Deer, Alberta. A sample bill is shown below. Before the billing meter, there is a regulator for 20 psi. A submeter is installed for the barn downstream of another regulator at 0.25 psi (4 oz.). Assume the submeter was installed October 1st and read 1,000 cubic feet of natural gas at the end of the month. To determine the energy used:

$$\text{Energy (GJ)} = \text{HV} \times \text{CF} \times \text{PF} \times \text{Volume}$$

The Heat Value (HV) is found on the bill: 39.55. The Conversion Factor (CF) is also found on the bill, labeled Unit Conversion. Since the submeter is reading gas at 0.25 psi, the Pressure Factor needs to be determined. The elevation in Red Deer is 2,821 feet. Using the online tool at https://submetersolutions.com/pressure_factor.htm, the pressure factor is 0.92 for the submeter.

HV, CF, and PF can be multiplied together to create one multiplier for this meter. In this case: $39.55 \times 0.0282624 \times 0.92 = 1.0284$. As long as the heat value does not change on your bill, this number only needs to be calculated once and can be used in the future for this meter. Multiplying this value by the volume reading will determine total energy:

$$\text{Energy (GJ)} = \text{HV} \times \text{CF} \times \text{PF} \times \text{Volume}$$

$$\text{Energy (GJ)} = 1.0284 \times 1000 \text{ cubic feet}$$

$$\text{Energy} = 1028.4 \text{ GJ}$$

Therefore, the barn used 1,028.4 GJ of natural gas out of a total 3,061 GJ for the month of October (see Sample Bill below).

Sample Bill

NATURAL GAS COMPANY

November 1, 2017

INVOICE #1234

Customer	Your Name	Rate class	Farm
Customer ID#	12345 6789	Pressure Factor	2.26
Address	Red Deer Alberta, Canada	Unit Conversion	0.0282624
Payment Due	Due Date	Heat Value	39.55
Amount Due	\$5,291.50	Utility Multiplier	1.000
		Profile Multiplier	1.000

From	To	Start (ft3)	End	Difference	Multiplier	Units Billed
10/01/17	10/31/17	45,678 ft ³	46,890 ft ³	1,212 ft ³	2.5262	3,061 GJ

Date	Description	Units Deferred	Amount	Balance
09/30/2017	Previous balance		\$	\$
10/15/2017	Payment		\$	\$
10/01/2017	Service Charge		\$400	\$400
10/31/2017	Gas Consumption Charge \$1.50/GJ	3,061	\$4,591.50	\$4,591.50
10/31/2017	Tax		\$300	\$300
10/31/2017	Total		\$5,291.50	\$5,291.50

Consumption

Month	Actual (ft ³)	Predicted (ft ³)
JAN	5000	
FEB	4500	
MAR	4000	
APR	2000	
MAY	1000	
JUNE	1000	
JULY	500	
AUG	500	
SEP	500	
OCT	3000	
NOV		4000
DEC		5000

Thank you for your business!

Natural Gas Company
Address
Contact

This value is specific for this location and 20 psi at the meter. Do not use if the submeter has a different pressure.

This value will always be 0.0282624 which converts cubic feet to GJ.

Need this heat value for the calculation.

This is all the multipliers combined. This will be different for the submeter if it has a different pressure.