Guidelines for Natural Gas Combustion – Determining Throughput of Multiple Devices Using Gas Utility Bills

(February 2026)

This document provides guidance on methodologies for estimating natural gas throughput for AER purposes only. The focus of this document is estimating individual throughputs (consumption) of natural gas combustion equipment using gas bills and fuel flow meters (if applicable) when multiple equipment are connected to the gas utility line. This document assumes the use of default emission factors and will not discuss alternate emission factors.

A throughput calculator has been prepared to aid in the estimation of individual throughputs using a combination of gas bills, equipment ratings, and any known consumption. This can be downloaded from the AER Webpage at www.aqmd.gov/aer.

Background

Natural gas is a mixture of gaseous hydrocarbons, with at least 80 percent methane by volume of pipeline quality. For most consumers in the areas regulated by South Coast AQMD, natural gas is supplied through pipelines from the supplier SoCal Gas. Natural gas is used as a fuel for a variety of external combustion and internal combustion equipment. External combustion equipment includes boilers, heaters, ovens and dryers. Internal combustion equipment includes engines, such as those that drive emergency stand-by generators, emergency fire pumps, compressors, gas turbines, and microturbines. Combustion of natural gas contributes to the emissions of Criteria Air Pollutants (CAPs) that include nitrogen oxides (NOx), sulfur oxides (SOx), volatile organic compounds (VOC), particulate matter (PM), carbon monoxide (CO), and Toxic Air Contaminants (TACs) such as Benzene and Formaldehyde.

AER requires emissions from all natural gas combustion equipment to be reported, including permitted and unpermitted (permit-exempt) equipment. The AER Webtool includes default emission factors that allow users to report emissions using throughput alone. Abbreviated reporters may omit unpermitted equipment from their AER provided they use the default emissions factors. Note: Only natural gas fueled boilers and heaters qualify for abbreviated reporting. Adding other natural gas-fired equipment or emission factors other than the defaults will prevent users from submitting an abbreviated report.

Other Useful Guidelines:

Abbreviated Reporting Guideline: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/guidelines-for-abbreviated-reporting-dec24.pdf?sfvrsn=bed28461_14

Default Combustion Emission Factors: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/combustion-default-emission-factors-2024.pdf

Throughput Data Sources

Reporters can estimate natural gas throughput (fuel consumption) using one or more of the following sources:

1. Dedicated fuel meter for each equipment
2. Continuous Emission Monitoring Systems (CEMS)
3. Rated heat input capacity of the equipment, in conjunction with,
4. Gas utility company gas bill

Fuel Meters - The amount of natural gas combusted by individual units can be measured by dedicated calibrated fuel meters. Metered natural gas is typically measured in different quantities of standard cubic feet (scf), including one-hundred standard cubic feet (CCF), one-thousand standard cubic feet (Mcf), and one-million standard cubic feet (MMscf). Recordkeeping of fuel consumption for larger units is typically required by the permit or applicable rules.

Continuous Emission Monitoring Systems (CEMS) – Large combustion equipment may be equipped with a CEMS and a fuel flowmeter, which monitor natural gas throughput into the equipment. Fuel flow records can typically be generated from CEMS data. This method is beyond the scope of this document. Reporters should contact CEMS contractors or manufacturers for assistance with understanding CEMS data.

Rated Heat Input Capacity - Combustion equipment is rated by its maximum heat input capacity, typically in units of MMBtu/hr (million British thermal units per hour) or Btu. The rating can be found on the permit or manufacturer's nameplate on the unit. The rating, in conjunction with either operating times or gas bills, can be used to estimate throughput.

Gas utility company gas bill - Gas utility bills can be used to determine the amount of natural gas supplied to combustion equipment. Data from gas bills can be combined with unit ratings to allot throughputs of multiple units as explained in the remainder of this document.

Estimating Throughputs Using Gas Bills

Gas utilities measure the total amount of natural gas supplied in the billing period (typically a calendar month) through a utility-owned gas meter. The meter takes measurements at the distribution point, so the consumption of all equipment connected to the gas line is aggregated in the bill. To determine individual throughputs for multiple units using gas bills, the following data is needed:

1. Total annual fuel consumption as determined by all monthly gas bills in the data year (12 months combined)

2. Equipment ratings (MMBtu/hr)
3. Any known consumption as determined by dedicated fuel meters

Gas Bills

The gas bill will indicate the total consumption in units of therms for the specified billing period as shown in **Figure 1** below.

Figure 1

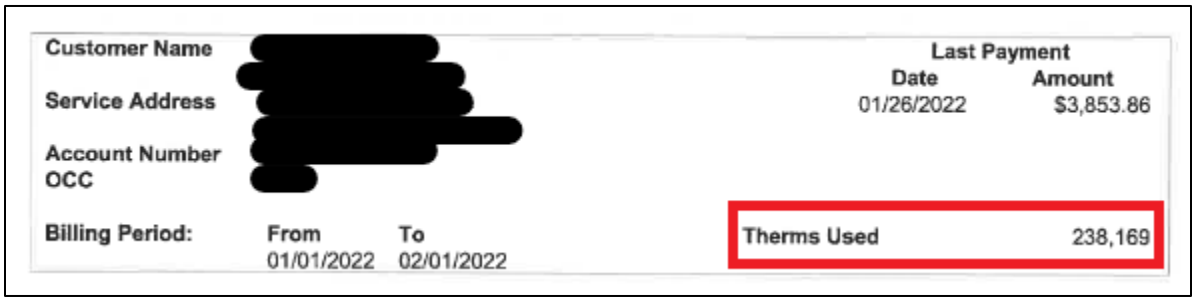
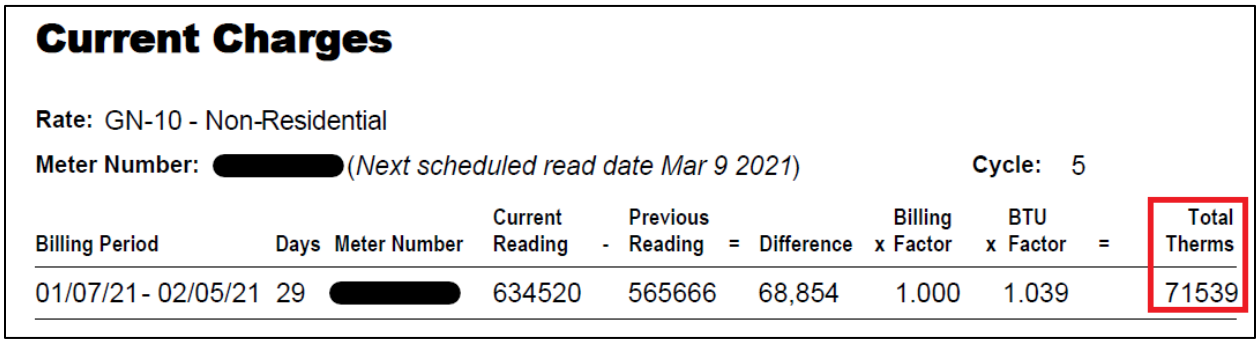


Figure 2 below shows a different format of a monthly gas bill indicating the difference in meter readings for the billing period and the corresponding total therms.

Figure 2



Current Charges

Rate: GN-10 - Non-Residential

Meter Number: [redacted] *(Next scheduled read date Mar 9 2021)* **Cycle:** 5

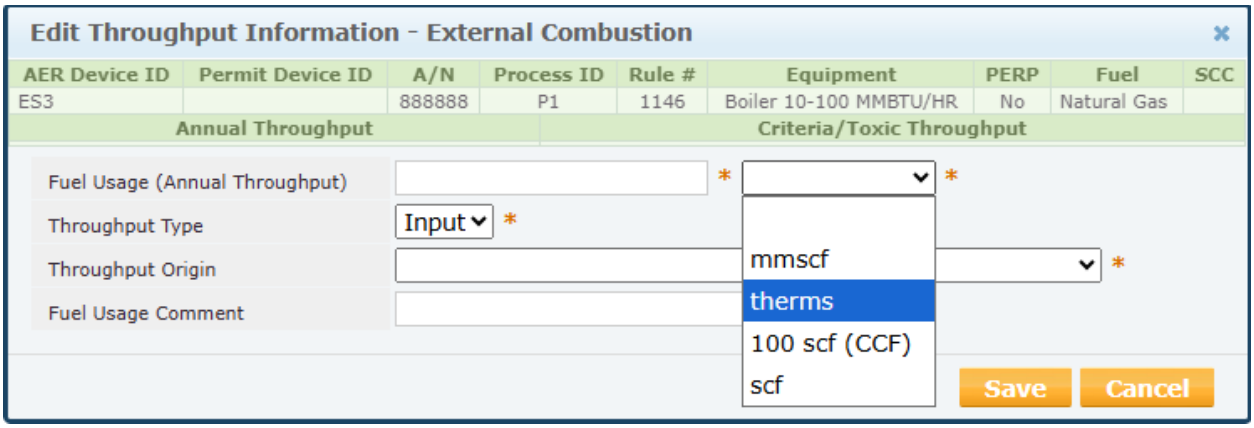
Billing Period	Days	Meter Number	Current Reading	-	Previous Reading	=	Difference	Billing x Factor	BTU x Factor	=	Total Therms
01/07/21 - 02/05/21	29	[redacted]	634520		565666		68,854	1.000	1.039		71539

For most consumers in the areas regulated by South Coast AQMD natural gas is supplied through pipelines from the supplier SoCal Gas. Additional information on how to read natural gas bills can be found here: https://www.socalgas.com/billing-payment/understanding-my-bill/how-to-read-my-bill

Throughput Units

Natural gas throughput can be entered into the AER WebTool in units of MMscf, therms, 100 scf (CCF), or scf as shown in **Figure 3** below. Default emission factors are provided in units of lbs/MMscf (pounds per one-million standard cubic feet).

Figure 3



Users are encouraged to report in units of therms to simplify calculations since gas utilities use therms for billing. The AER Webtool will convert the throughput to units of MMscf for compatibility with default emission factors which are provided in units of lb/MMscf (pounds per million scf.). The AER Webtool uses the following conversion:

$$1\ therm = 100{,}000\ Btu = 0.1\ MMBtu$$

$$Higher\ Heating\ Value\ (HHV) of\ Natural\ Gas = 1050\ MMBtu/MMscf$$

$$\frac{1\ therm}{0.1\ MMBtu} \times \frac{1050\ MMBtu}{1\ MMscf} = \mathbf{10{,}500}\ \boldsymbol{\frac{therms}{MMscf}}$$

Throughput for Metered Equipment

For each unit with a dedicated natural gas fuel meter connected to the gas line, throughput is determined by records of fuel meter readings. This can be done by subtracting the final fuel meter reading of the year from the first meter reading of the year.

Since fuel meter readings are typically measured in volumetric units, for compatibility with gas bills, convert these values to therms using **Table 1** below or the unit converter in the calculator. Both provide conversion factors for common units of fuel meters.

Table 1

Fuel Meter is in units of:	Convert to therms by multiplying by:
Standard cubic feet [scf]	0.0105
100 cubic feet [CCF]	1.05
1000 cubic feet [KCF, MCF]	10.5
Million standard cubic feet [MMscf]	10500

Note: The throughput calculator accounts for all units connected to the utility gas line including metered and non-metered units. If a unit is not connected to the utility gas line, and therefore, not included in the same gas bills, that throughput should be determined separately.

Equipment Rating

If multiple units of varying ratings are connected to the utility gas line, gas bills alone will not determine throughput of individual equipment. Relative fuel consumption can be estimated by ratioing the total usage by the equipment ratings. Natural gas-fired equipment are rated in units of Btu or MMBtu (British thermal units or one-million British thermal units, respectively). The rating can be found on the permit description or manufacturer's nameplate or label. In some cases, the model number indicates the rating.

Using the AER Throughput Calculator

The AER Natural Gas Throughput Calculator can be used to estimate throughputs of each individual unit included in a gas bill. The calculator accounts for metered units on a gas bill by first subtracting out the known consumption from the total and then allocating individual throughputs using the individual equipment ratings.

The AER Natural Gas Throughput Calculator performs this calculation with the assumption that each unit operated for the same or similar duration in the data year.

In preparation for using the AER Natural Gas Throughput Calculator, gather the following documents and information:

- Monthly gas utility company bills (January through December) for the gas line that feeds into the natural gas combustion equipment.
- Total amount of units included in the gas bill (connected to utility line)
- Fuel flow meter records for the year for all equipment with a dedicated fuel flow meter with throughputs converted to therms using **Table 1** above or the unit converter on the calculator.
- For the units without a fuel flow meter, information of the equipment's maximum heat input capacity rating in units of Btu/hr or MMBtu/hr.

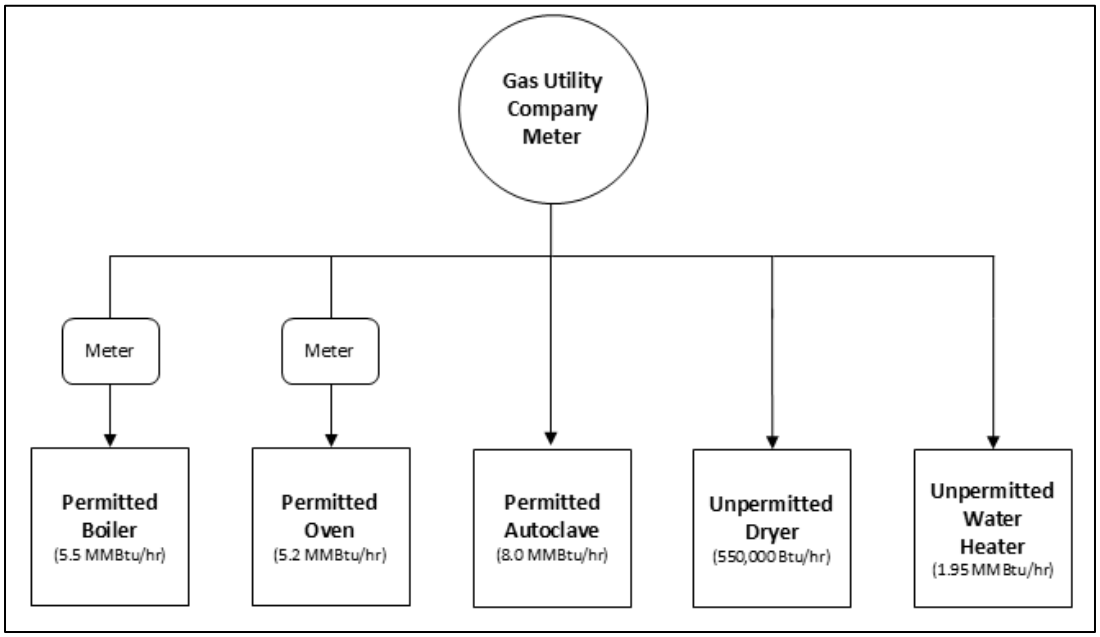
The following is an example of how to determine natural gas throughput of unmetered equipment using the calculator.

Example 1

Facility ABC operates one autoclave (8 MMBtu/hr), one boiler (5.5 MMBtu/hr), one oven (5.2 MMBtu/hr), one dryer (550,000 Btu/hr), and one water heater (1.95 MMBtu/hr). The autoclave is permitted but is not equipped with a natural gas fuel meter. The boiler and oven are permitted and are both equipped with natural gas fuel meters. Based on records of fuel meter readings, the annual

natural gas usage of the boiler and oven are 35.7 MMscf and 16.2 MMscf, respectively. The dryer and water heater are unpermitted and are not equipped with natural gas fuel meters. Based on the gas company's monthly bills, the facility consumed 600,000 therms of natural gas for the year.

The equipment can be organized in a facility diagram as follows:



Drawing out the facility diagram can be helpful to ensure all equipment is included and reported correctly. Each unit is labeled with its equipment rating, as metered or unmetered, and permitted or unpermitted. This information can be used to fill in the AER Fuel Throughput Calculator.

Using the above information, the data is entered into the calculator as follows:

1) Complete all fields in yellow

Totals	
Total Number of Devices with Natural Gas Combustion (i.e. permitted oven, unpermitted boiler/water heater, etc.)	5
Total Annual Consumption (therms) (all devices combined including metered devices)	600,000
Permitted Devices	
Total number of permitted devices	3
Total number of permitted devices with dedicated meters	2
Unpermitted Devices	
Total number of unpermitted devices	2
Total number of unpermitted devices with dedicated meters	0

The Calculator distributes the number of units as follows:

Permitted Devices						
With Meters Enter consumption if known			Without Meters Green boxes will calculated			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
1			1			
2						
Total: 2		Total: 0.0	Total: 1			Total: 0.0

Unpermitted Devices						
With Meters Enter consumption if known			Without Meters May be omitted from Abbreviated Reports			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
0			1			
			2			
Total: 0		Total: 0.0	Total: 2			Total: 0.0

A label can be given to each unit to aid in identification:

Permitted Devices						
With Meters Enter consumption if known			Without Meters Green boxes will calculated			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
1	Boiler		1	Autoclave		
2	Oven					
Total: 2		Total: 0.0	Total: 1			Total: 0.0

Unpermitted Devices						
With Meters Enter consumption if known			Without Meters May be omitted from Abbreviated Reports			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
0			1	Dryer		
			2	Water Heater		
Total: 0		Total: 0.0	Total: 2			Total: 0.0

The Boiler and Oven have meters that measure fuel consumption in units of MMscf and must be converted to therms before entering into the calculator. The consumption in MMscf is entered into the appropriate box and the value in therms is calculated:

Value	Unit Used by Meter	Calculated Value in therms	
	scf	0	therms
	ccf (100 scf)	0	therms
	kcf (1000 scf)	0	therms
35.7	mmscf (1,000,000 scf)	374850	therms

Value	Unit Used by Meter	Calculated Value in therms	
	scf	0	therms
	ccf (100 scf)	0	therms
	kcf (1000 scf)	0	therms
16.2	mmscf (1,000,000 scf)	170100	therms

Now, this known fuel consumption in therms can be entered in the corresponding fields for the metered units. Ratings in mmBtu are entered to each corresponding unit. Once entered, the throughputs of the remaining devices are calculated and displayed:

Permitted Devices

With Meters — Enter consumption if known			Without Meters — Green boxes will calculated			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
1	Boiler	374,850.0	1	Autoclave	8.00	41942.9
2	Oven	170,100.0				
Total: 2		Total: 544950.0	Total: 1			Total: 41942.9

Unpermitted Devices

With Meters — Enter consumption if known			Without Meters — May be omitted from Abbreviated Reports			
Index	Name (Identifier)	Known Consumption (therms)	Index	Name (Identifier)	Rating (mmBtu)	Calculated Throughput (therms)
0			1	Dryer	0.55	2883.6
			2	Water Heater	1.95	10223.6
Total: 0		Total: 0.0	Total: 2			Total: 13107.1

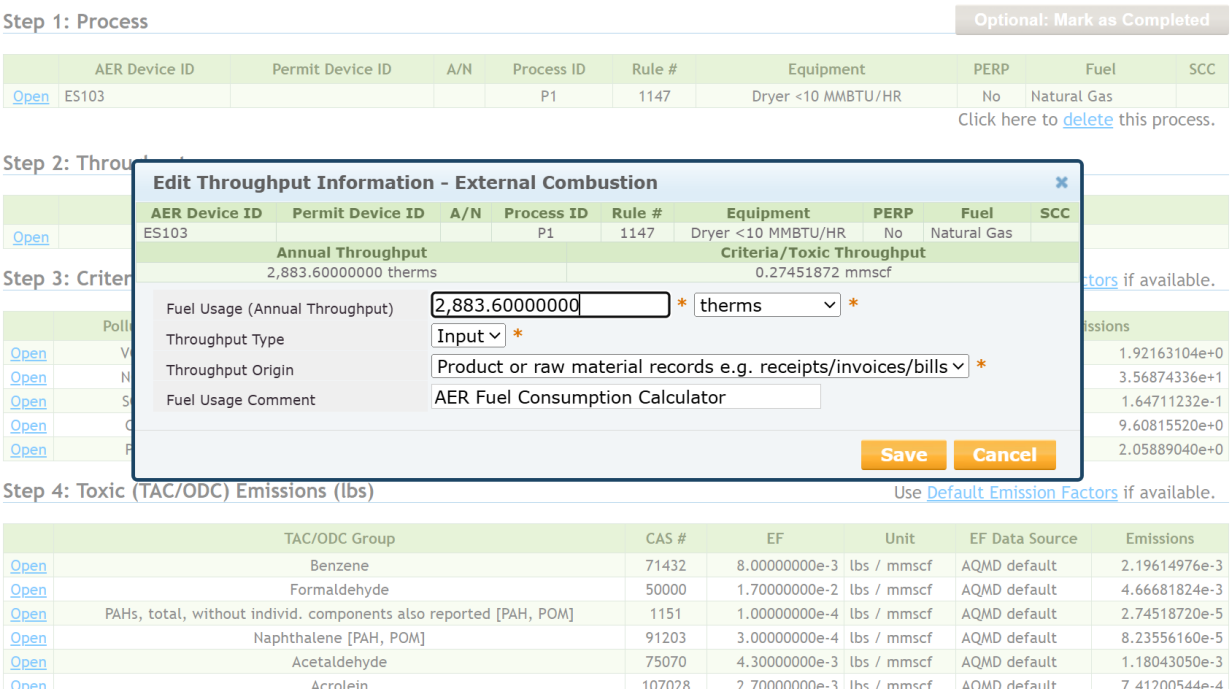
This information is used to complete the AER in the WebTool.

Permitted devices will be preloaded but new devices need to be added manually. Below is the correct set up for this example:

Emission Source (ES)	Emissions	A/N	Permit NO	Permit Device ID	Permit Equipment Description	AER Device ID	ES Name	ES Group Name	Source Category	Has Emissions	Equipment	PERP	Release Location Linked	ES Status
Profile	Open	123456	F00001		BOILER 5.5 MMBTU/HR	ES100	Boiler		External Combustion	Y	Boiler <10 MMBTU/HR	N	N	Work in progress
Profile	Open	234567	F00002		OVEN 5.2 MMBTU/HR	ES101	Oven		External Combustion	Y	Oven <10 MMBTU/HR	N	N	Work in progress
Profile	Open	345678	F00003		AUTOCLAVE 8.0 MMBTU/HR	ES102	Autoclave		External Combustion	Y	Oven <10 MMBTU/HR	N	N	Work in progress
Profile	Open					ES103	Dryer		External Combustion	Y	Dryer <10 MMBTU/HR	N	N	Work in progress
Profile	Open					ES104	Water Heater		External Combustion	Y	Space/Water heater - not related to a process <10 MMBTU/HR	N	N	Work in progress

Showing 1 to 5 of 5 entries Previous Next

Below shows the throughput entry for the dryer as calculated by the AER Calculator.



More reporting guidance can be found on the AER webpage: www.aqmd.gov/aer

AER Support Hotline
Phone (voicemail only): (909) 396-3660
Email (preferred): aer@aqmd.gov