What is claimed is:

1. A method for determining an energy content of a gas mixture containing hydrogen using a gas density meter, comprising the steps of:

providing a vibratory gas density meter;

providing meter electronics with the gas density meter configured to communicate with at least one external input wherein the external input comprises a percent $H_2$ value of the hydrogen-rich gas mixture;

measuring a density of the gas mixture containing hydrogen;

measuring a specific gravity of the gas mixture containing hydrogen; and

deriving a calorific value of the gas mixture containing hydrogen using the measured specific gravity and a plurality of constant values.

2. The method of Claim 1, wherein a Wobbe Index value of the gas mixture containing hydrogen is calculated.

3. The method of Claim 1, wherein the calorific value (*CV*) is calculated according to an equation comprising: $CV = \mathrm{A} + (\mathrm{B} \cdot \mathrm{percent}\, H_2) + (C \cdot \mathrm{percent}\, CO) + (D \cdot \mathrm{percent}\, CO_2) + (E \cdot \mathrm{percent}\, N_2) + (F \cdot SG)$, where A-F comprise the constant values, and *SG* comprises the specific gravity.

4. The method of Claim 3, wherein A is between 144.8 and 150.8, wherein B is between -2.5 and -2.6, wherein C is between -12.15 and -12.65, wherein D is between -47.7 and -49.65, wherein E is between -24.68 and -25.69, and wherein F is between 1528.7 and 1591.1.

5. The method of Claim 3, wherein A is 147.8458, B is -2.55807, C is -12.3963, D is -48.685065, E is -25.18546, and F is 1559.94255.

6. The method of Claim 1, wherein the percent $H_2$ value is determined with a thermal conductivity meter.

7. The method of Claim 3, wherein the external input comprises a percent CO value of the hydrogen-rich gas mixture.

8. The method of Claim 7, wherein the percent CO value is determined with a near infrared meter.

9. The method of Claim 3, wherein the external input comprises a percent $CO_2$ value of the hydrogen-rich gas mixture.

10. The method of Claim 9, wherein the percent $CO_2$ value is determined with a near infrared meter.

11. The method of Claim 3, wherein the external input comprises a percent $N_2$ value of the hydrogen rich gas mixture.

12. The method of Claim 11, wherein the percent $N_2$ value is determined with a gas chromatograph.

13. The method of Claim 1, wherein deriving the calorific value is accomplished in a frequency of under 10 seconds.

14. A system (100) for measuring gas energy, comprising:

a vibratory gas density meter (101) configured to calculate a specific gravity of a gas mixture containing hydrogen;

a communication line (114) configured to connect to an external input (116) wherein the external input comprises a percent $H_2$ value of the hydrogen-rich gas mixture;

meter electronics (112) for operating the vibratory gas density meter (101) in communication with the communication line (114), wherein the meter electronics (112) is configured to measure a density of the gas mixture containing hydrogen and derive a calorific value of the gas mixture containing hydrogen using the derived specific gravity and a plurality of constant values.

15. The system (100) of Claim 14, wherein the external input (116) comprises at least one of a near infrared meter, a thermal conductivity meter, and a gas chromatograph.

16. The system (100) of Claim 14, wherein meter electronics (112) is configured to calculate a Wobbe Index value of the hydrogen-rich gas mixture.

17. The system (100) of Claim 14, wherein the calorific value (*CV*) is calculated according to an equation comprising:
$CV = \mathrm{A} + (\mathrm{B} \cdot \mathrm{percent}\, H_2) + (C \cdot \mathrm{percent}\, CO) + (D \cdot \mathrm{percent}\, CO_2) + (E \cdot \mathrm{percent}\, N_2) + (F \cdot SG)$, where A-F comprise the constant values, and *SG* comprises the specific gravity.

18. The system (100) of Claim 17, wherein A is between 144.8 and 150.8, wherein B is between -2.5 and -2.6, wherein C is between -12.15 and -12.65, wherein D is between -47.7 and -49.65, wherein E is between -24.68 and -25.69, and wherein F is between 1528.7 and 1591.1.

19. The system (100) of Claim 17, wherein A is 147.8458, B is -2.55807, C is -12.3963, D is -48.685065, E is -25.18546, and F is 1559.94255.

20. The system (100) of Claim 17, wherein at least one of the percent H2, percent CO, percent $CO_2$, and percent $N_2$ is provided to the meter electronics (112) from the external input (116).