WHAT IS CLAIMED IS

1. A retrofit water boiler monitoring and forecast system, for a water boiler system which includes a water boiler, a cold-water intake pipe, a hot-water outlet pipe, the retrofit system comprising:

(a) an intake temperature sensor, configured to measure a water temperature in the cold-water intake pipe;

(b) a flow meter, configured to measure a flow rate of water running through the water boiler system;

(c) an outlet temperature sensor, configured to measure a water temperature in the hot-water outlet pipe;

(d) a processing unit, adapted to receive sensor data from said intake temperature sensor, said flow meter, and said outlet temperature sensor when said water is running through the water boiler system, and configured to calculate an amount of available hot water remaining based on a current flow rate; and

(e) a display panel operationally coupled to said processing unit, said display panel configured to display at least one estimated Real-Time Usage Value (RTUV) such as a time remaining before said hot water is finished or a remaining number of hot water activities available, calculated by said processing unit based on said amount of available hot water wherein all components of the retrofit system are added to the water boiler system outside of the water boiler tank.

2. The retrofit system of claim 1, further comprising:

(f) a control panel operationally coupled to said processing unit, including a user interface adapted to receive instructions for programming and controlling said processing unit.

3. The retrofit system of claim 2, wherein said control panel is operationally coupled to an activation switch of the water boiler.

4. The retrofit system of claim 1, wherein said processing unit includes: a non-transient memory adapted to retrievably store usage data, said usage data including said sensor data recorded over time.

5. The retrofit system of claim 1, wherein said display panel is adapted to be mounted in a bathing area.

6. The retrofit system of claim 1, wherein said at least one estimated RTUV is an estimated amount of time remaining during which said hot water will be available, based on said flow rate.

7. The retrofit system of claim 1, wherein said at least one estimated RTUV includes a number of distinct hot-water activities that can be completed with said amount of available hot water.

8. The retrofit system of claim 7, wherein another estimated RTUV displayed on said display panel includes a measure of time remaining for completing one of said distinct hot water activities, based on said flow rate.

9. The retrofit system of claim 1, wherein said at least one Real-Time Usage Value includes a measure of time remaining before a requisite amount of hot water is available.

10. The retrofit system of claim 4, wherein said at least one Real-Time Usage Value includes an indication of a working condition of a heating element of the water boiler system.

11. The retrofit system of claim 10, wherein said working condition of said heating element is calculated based on said sensor data compared to said usage data.

12. The retrofit system of claim 4, wherein said processing unit includes logic for calculating said amount of available hot water, said logic including an adaptive learning algorithm configured to learn characteristics of the water boiler system based on said usage data stored in said non-transient memory.

13. The retrofit system of claim 12, wherein said amount of available hot water is calculated based on said learned characteristics of the water boiler system.

14. The retrofit system of claim 13, wherein said amount of available hot water is further calculated based on learned usage characteristics of the water boiler.

15. The retrofit system of claim 12, wherein said processor calculates a relative level of efficiency of a heating element of the water boiler system, based on said learned characteristics of the water boiler system.

16. The retrofit system of claim 4, wherein said processing unit includes logic for calculating said amount of available hot water, said logic including an adaptive learning algorithm configured to learn usage characteristics of the water boiler based on said usage data.

17. The retrofit system of claim 16, wherein said amount of available hot water is further calculated based on learned characteristics of the water boiler.

18. The retrofit system of claim 1, wherein said processing unit includes logic configured to detect a leak in the water boiler system, based on said sensor data.

19. The retrofit system of claim 1, wherein said processing unit is configured to distinguish between sources of hot-water usage.

20. The retrofit system of claim 1, further adapted for use with a water boiler system including a solar collector, the retrofit system further comprising at least one of:

(i) a second flow meter adapted to measure water flow through said solar collector operationally coupled to the water boiler;

(ii) a solar collector outlet sensor adapted to measure temperature of water flowing from said solar collector to the water boiler; and

(iii) a solar collector intake sensor adapted to measure temperature of water flowing from the water boiler to said solar collector.

21. The retrofit system of claim 20, further comprising a photo voltaic (PV) cell, said PV cell being adapted to provide solar-related data.

22. The retrofit system of claim 21, wherein said PV cell further produces usable energy.

23. A method for providing a real-time estimate of available hot water in a hot water boiler, the method comprising the steps of:

(a) retrofitting an intake temperature sensor and flow meter on an intake pipe outside the water boiler and an outlet temperature sensor on an outlet pipe outside the water boiler;

(b) receiving flow data of water running through said intake pipe connected to the water boiler, from said flow meter operationally coupled to said intake pipe;

(c) receiving an outlet temperature measurement of water in a boiler outlet pipe connected to the water boiler from said outlet temperature sensor in said outlet pipe; and

(d) receiving an intake temperature measurement of water in a boiler intake pipe connected to the water boiler from said intake temperature sensor operationally coupled to said intake pipe;

(e) calculating an estimated amount of hot water in the boiler based on said flow data, outlet temperature measurement and intake temperature measurement taken while water is flowing through the water boiler system;

(f) displaying a current amount of available hot water in real time on a display panel located in a bathing area.

24. The method of claim 23, further comprising the step of:

(f) receiving a thermostat value, prior to step (e).

25. The method of claim 23, wherein said flow data includes at least one of: a flow rate value and a flow duration value.

26. A method for calculating an estimated amount of hot water in a water boiler, the method comprising the steps of:

(a) receiving sensor data over a predetermined time interval, said sensor data including at least: flow data of water running through an intake pipe connected to the water boiler, an outlet temperature measurement of said water in an outlet pipe connected to the water boiler from an outlet temperature sensor in said outlet pipe and an intake temperature measurement of said water in an intake pipe connected to the water boiler from an intake temperature sensor operationally coupled to said intake pipe;

(b) comparing said received sensor data with stored sensor data previously received from said intake temperature sensor, said outlet temperature sensor and said flow meter; and

(c) calculating, based on said comparison, an approximate amount of available hot water in the water boiler in real time, wherein said temperature sensors and flow meter are added outside of the water boiler; and

(d) displaying an amount of time before said approximate amount of available hot water is finished or a number of currently available hot water activities based on said approximate amount of available hot water.

27. The method of claim 26, further comprising the step of:

(d) storing said received sensor data on a non-transient storage medium.

28. The method of claim 27, wherein said stored sensor data includes aggregated sensor data.

29. The method of claim 27, further comprising the step of:

(d) analyzing said flow sensor data so as to extrapolate usage data.

30. The method of claim 29, wherein said usage data includes:

(i) distinct usage activities,

(ii) usage patterns for said distinct usage activities.

31. The method of claim 26, further comprising the step of:

(d) analyzing said sensor data to extrapolate water boiler characteristics.

32. The method of claim 31, wherein said water boiler characteristics include at least one of:

(i) boiler efficiency,

(ii) heating time,

(iii) water leakage, and

(iv) environmental affect on said heating time.

33. A computer program product embodied on a non-transitory storage medium and executed via a processor for effecting the steps of claim 26.

34. The retrofit system of claim 22, wherein said usable energy is adapted to power at least the retrofit system.

35. A method for providing an interactive learning heating schedule for a water boiler system, the method comprising the steps:

(a) providing the water boiler system including:

(i) an intake temperature sensor, configured to measure a water temperature in a cold-water intake pipe of the water boiler system,

(ii) a flow meter, configured to measure a flow rate of water running through the water boiler system,

(iii) an outlet temperature sensor, configured to measure a water temperature in the hot-water outlet pipe of the water boiler system, and

(iv) a processing unit, adapted to receive sensor data from said intake temperature sensor, said flow meter, and said outlet temperature sensor in real time while water is flowing through the water boiler system, and configured to calculate an estimate of an amount of available hot water in a water boiler, based on said sensor data;

(b) receiving said estimate of an amount of available hot water in the water boiler of the water boiler system;

(c) receiving usage data of the water boiler system over a predetermined time period, said usage data including at least one expected usage pattern extrapolated from said usage data; and

(d) generating a heating schedule for said water boiler, based on said at least one expected usage pattern and said estimated amount of available hot water.

36. The method of claim 35, further comprising the step of:

(d) detecting a deviation in said expected usage pattern, and

(e) adjusting said heating schedule as a result of said detected deviation.

37. The method of claim 36, wherein said deviation is selected from the group of deviations including: a current deviation in said expected usage pattern and an expected deviation in said expected usage pattern.

38. The method of claim 36, further comprising the step of:

(f) sending a feedback request to a user after detecting said deviation and prior to adjusting said heating schedule.

39. The method of claim 38, further comprising the step of sending a secondary request after a predetermined time has lapsed prior to receiving a feedback response to said feedback request.

40. The method of claim 39, wherein said secondary request is selected from the group of requests including: a second feedback request to said user, a second feedback request to a second user related to said user.

41. The method of claim 38, wherein said step of adjusting said heating schedule is performed after a predetermined time has lapsed prior to receiving a feedback response to said feedback request.

42. The method of claim 38, wherein said step of adjusting said heating schedule is skipped after a predetermined time has lapsed prior to receiving a feedback response to said feedback request.

43. The method of claim 38, further comprising the step of:

(g) receiving a feedback response from said user, wherein said step of adjusting said heating schedule is performed or skipped based on said feedback response.

44. The method of claim 35, wherein said expected usage pattern is further extrapolated from a location of a user of the water boiler system.

45. The method of claim 36, wherein said expected usage pattern is further extrapolated from a location of a user of the water boiler system and wherein said deviation is detected when said location of said user is different from an expected said location of said user.

46. The method of claim 35, wherein said expected usage pattern is further extrapolated from an activity of a user of the water boiler system.

47. The method of claim 36, wherein said expected usage pattern is further extrapolated from an activity of a user of the water boiler system and wherein said deviation is detected when said activity of said user is different from an expected said activity of said user.

48. The method of claim 35, wherein said expected usage pattern is further extrapolated from an activity and location of a user of the water boiler system.

49. The method of claim 36, wherein said expected usage pattern is further extrapolated from an activity and location of a user of the water boiler system and wherein said deviation is detected when said activity and location of said user is different from an expected said activity and location of said user.

50. A computer program product embodied on a non-transitory storage medium and executed via a processor for effecting the steps of claim 35.