CLAIMS

1. A system for discharging hydrogen from one or more hydrogen storage vessels, the hydrogen storage vessel or vessels containing solid hydrogen storage material, the system including:

a hydrogen supply line for connecting to a hydrogen demand;

an energy delivery system to provide heat to the hydrogen storage material in at least one of the hydrogen storage vessels to desorb hydrogen from the solid hydrogen storage material;

a process control system; wherein the process control system monitors the ~~description~~ desorption process from the one or more hydrogen storage vessels; wherein the process control system regulates ~~the~~ delivery of energy from the energy delivery system to the one or more hydrogen storage vessels;

one or more supply connection conduits for connecting the supply line to the one or more hydrogen storage vessels; wherein

each supply connection conduit connected to a hydrogen storage vessel has a backflow prevention device to prevent or limit hydrogen in the supply line from flowing back into that hydrogen storage vessel when the solid storage material is no longer desorbing hydrogen at the pressure of the supply line.

2. The system of claim 1 wherein the energy delivery system is deactivated and no longer provides heat to the hydrogen storage vessel when the solid storage material is no longer desorbing hydrogen at the pressure of the supply line.

3. The system of claim 1 or 2 wherein the backflow prevention device is a one-way valve or a shut-off valve.

4. The system of claim 2 or 3 wherein an auxiliary hydrogen supply system is provided to supply hydrogen to the hydrogen storage vessel once the energy delivery system has been deactivated.

5. The system of claim 4 wherein the auxiliary hydrogen supply system is an auxiliary hydrogen conduit from the supply line to at least the hydrogen storage vessel which has been deactivated.

6. The system of claim 5 wherein the auxiliary hydrogen conduit has a pressure control valve to supply hydrogen to the deactivated hydrogen storage vessel at a pressure lower than the pressure in the supply line.

7. The system of claim 6 wherein the pressure control valve supplies hydrogen to the deactivated hydrogen storage vessel at a pressure slightly above atmospheric pressure.

8. The system of claim 7 wherein the pressure control valve is a step down valve.

9. The system of claim 4 wherein the auxiliary hydrogen supply system is a secondary hydrogen storage cylinder.

10. The system of claim 9 wherein the hydrogen gas cylinder supplies gas at a pressure to maintain the pressure in the deactivated hydrogen storage unit at a pressure positive to atmospheric pressure.

11. A system for delivering a supply of hydrogen to a hydrogen supply line including:

one or more hydrogen storage vessels containing solid hydrogen storage material,

at least one energy delivery system to supply heat to the solid hydrogen storage material in at least one hydrogen storage vessel, the heat being sufficient to desorb hydrogen from the solid hydrogen storage material; and

a control system to control the timing of activation of the energy delivery system based on the hydrogen demand in the hydrogen supply line, the control system being configured to anticipate or determine a time when hydrogen will need to be supplied from the hydrogen storage vessel to the hydrogen supply line to meet the hydrogen demand, and activate the energy delivery system in the hydrogen storage vessel a period of time prior to the anticipated time to allow the material in the hydrogen storage vessel to heat to the temperature at which hydrogen can be supplied at the supply pressure of the hydrogen supply line to meet the hydrogen demand in the supply line~~.~~; and

wherein the control system includes a process control system which monitors the desorption process from the one or more hydrogen storage vessels; wherein the process control system regulates delivery of energy from the energy delivery system to the one or more hydrogen storage vessels from the at least one energy delivery system.

12. The system of claim 11 including two or more hydrogen storage vessels containing hydrogen storage material, the control system being configured to anticipate or determine a time when hydrogen supply from a first hydrogen storage vessel will fall below a predetermined level and activate the energy delivery system in a second hydrogen storage vessel a predetermined time prior to the anticipated or determined time to allow the material in the second hydrogen storage vessel to heat to the temperature at which hydrogen can be supplied at the supply pressure of the hydrogen supply line to meet the hydrogen demand in the supply line.

13. The system of claim 11, wherein the control system comprises

a sensor which monitors a variable of hydrogen supply to the supply line, and

a processor which activates the energy delivery system in the hydrogen storage vessel when it determines that the hydrogen supply has fallen below a predetermined level.

14. The system of claim 12 or 13 wherein the processor deactivates the energy delivery system of one or more of the hydrogen storage vessels when the pressure of hydrogen has fallen below the pressure in the hydrogen supply line.

15. A method of supplying hydrogen from a hydrogen delivery system to a hydrogen supply line, the system including one or more hydrogen storage vessels containing solid hydrogen storage material, at least one energy delivery system to supply heat to the solid hydrogen storage material in at least one hydrogen storage vessel, the heat being sufficient to desorb hydrogen from the solid hydrogen storage material; and a control system to control the timing of activation of the energy delivery system based on the hydrogen demand in the hydrogen supply line, the method including the steps of

anticipating or determining a time when hydrogen will need to be supplied from the hydrogen storage vessel to the hydrogen supply line to meet the hydrogen demand, and

activating the energy delivery system in the hydrogen storage vessel a period of time prior to the anticipated time to allow the material in the hydrogen storage vessel to heat to the temperature at which hydrogen can be supplied at the supply pressure of the hydrogen supply line to meet the hydrogen demand in the supply line~~.~~; and

wherein the control system includes a process control system which monitors the desorption process from the one or more hydrogen storage vessels; wherein the process control

system regulates delivery of energy from the energy delivery system to the one or more hydrogen storage vessels from the at least one energy delivery system.

16. The method of claim 15 further including the step of deactivating the energy delivery system and no longer providing heat to the hydrogen storage vessel when the solid storage material in the hydrogen storage vessel is no longer desorbing hydrogen at the pressure of the supply line.