THE CLAIMS

What is claimed is:

1. A gas storage and dispensing vessel, comprising a vessel container defining a gas storage interior volume, and a valve head regulator assembly secured to the vessel container, the valve head regulator assembly comprising a single gas pressure regulator disposed in the interior volume of the vessel container, and a valve head including a pneumatic flow control valve, wherein the single regulator is configured with a set point pressure of at least 0.5 MPa, and wherein the interior volume of the vessel container is at least 5 L.

2. The gas storage and dispensing vessel of claim 1, wherein the set point pressure of the single regulator is in a range of from 0.5 MPa to 1.5 MPa.

3. The gas storage and dispensing vessel of claim 1, wherein the interior volume of the vessel container is in a range of from 40 L to 220 L.

4. The gas storage and dispensing vessel of claim 1, containing gas in the interior volume of the vessel container at pressure in a range of from 4 MPa to 14 MPa.

5. The gas storage and dispensing vessel of claim 4, wherein said gas comprises gas selected from the group consisting of arsine, phosphine, nitrogen trifluoride, boron trifluoride, boron trichloride, diborane, trimethylsilane, tetramethylsilane, disilane, silane, germane, organometallic gaseous reagents, hydrogen selenide, hydrogen telluride, stibine, chlorosilane, germane, disilane, trisilane, methane, hydrogen sulfide, hydrogen, hydrogen fluoride, diboron tetrafluoride, hydrogen chloride, chlorine, fluorinated hydrocarbons, halogenated silanes, SiF_4, halogenated disilanes, Si_2F_6, GeF_4, PF_3, PF_5, AsF_3, AsF_5, He, N_2, O_2, F_2, Xe, Ar, Kr, CO, CO_2, CF_4, CHF_3, CH_2F_2, CH_3F, NF_3, COF_2, mixtures of two or more of the foregoing, and isotopically enriched variants of the foregoing.

6. The gas storage and dispensing vessel of claim 1, in combination with a gas cabinet in which the gas storage and dispensing vessel is disposed.

7. The gas storage and dispensing vessel of claim 1, in combination with (i) a gas box in which the gas storage and dispensing vessel is disposed, and (ii) a process tool that is configured to operate at an elevated voltage in relation to the gas box, wherein the process tool is arranged to receive gas from the gas storage and dispensing vessel disposed in the gas box.

8. The gas storage and dispensing vessel of claim 1, operatively coupled to a float zone crystallization apparatus to receive gas from the gas storage and dispensing vessel.

9. A flat-panel display manufacturing process system, comprising a gas storage and dispensing vessel according to claim 1, operatively arranged to supply gas for manufacture of flat-panel display products.

10. A method of enhancing operation of a gas-utilizing process facility, comprising supplying for use in the gas-utilizing process facility gas packaged in a gas storage and dispensing vessel according to claim 1.