CLAIMS

What is claimed is:

1. A power plant, comprising:

an AC generator coupled to an AC bus;

an AC-to-DC converter coupled to the AC bus and a DC bus;

a switch coupled to the DC bus;

an AC load coupled to the AC bus;

a DC load coupled to the DC bus; and

an active power compensation system coupled to the switch, wherein the active power compensation system reduces power load variations in the power plant by delivering power to the AC load through the AC bus, the AC-to-DC converter and the DC bus when a power output of the AC generator is lower than a power demand of the AC load.

2. The power plant of claim 1, in which the switch comprises a DC-to-DC converter.

3. The power plant of claim 1, in which the active power compensation system comprises power consumption devices to consume power when a load on the power plant decreases.

4. The power plant of claim 3, in which the power consumption devices are resistors.

5. The power plant of claim 3, in which the active power compensation system further comprises at least one energy storage device to provide energy when the load on the power plant increases.

6. The power plant of claim 1, in which the at least one energy storage device comprises at least one of an ultracapacitor, a capacitor, a battery, and a fly wheel.

7. The power plant of claim 6, in which the at least one energy storage device is coupled to one or more microcontrollers, wherein the one or more microcontrollers regulate the at least one energy storage device.

8. A method of reducing variations in a power load on an AC generator in a power plant, comprising:

~~routing power from an active power compensation system to an AC load, through a DC bus coupled to the active power compensation system and through a DC-to-AC converter coupled to the DC bus and to the active power compensation system, during a time when a power output of the AC generator coupled to the AC load is lower than a power demand of the AC load.~~routing power between the generator and at least one power consuming device during a time when the power load on the generator is lower than a first level to maintain a substantially constant power output of the generator;

routing power between an energy storage device and the generator during a time when the power load on the generator is higher than a second level, wherein the energy storage device provides energy to the power plant to maintain a substantially constant power output of the generator;

routing power between the generator and the energy storage device during a time when the power load on the power plant is lower than a third level, wherein the third level is lower than the second level, and wherein the energy storage device stores energy from the power plant or a power dissipating device to maintain a substantially constant power output of the generator, wherein the power dissipating device consumes power from the power plant and is able to regenerate power.

~~9. The method of claim 8, in which the step of routing power comprises routing power from a DC energy storage device coupled to the DC bus.~~

~~10. The method of claim 9, in which the DC energy storage device provides a power output, that when summed with a power output of the AC generator, maintains a substantially constant power level at the AC load.~~

~~11. The method of claim 9, in which the step of routing power comprises routing power from at least one of an ultracapacitor, a capacitor, a battery, and a fly wheel.~~

~~12. The method of claim 8, further comprising activating a switch coupling the active power compensation system to the DC bus before the step of routing power.~~

~~13. The method of claim 12, in which the step of activating the switch comprises activating a DC-to-DC converter.~~

~~14. The method of claim 8, further comprising routing power from the AC generator, through the DC-to-AC converter and the DC bus, to the active power compensation system when a load on the AC generator is lower than the power output of the AC generator.~~

9. The method of claim 8, in which the at least one power consuming device comprises at least one of a resistive element, variable resistive element, and a water break.

10. The method of claim 8, in which the first level is based, in part, on a fuel efficiency of the generator.

11. The method of claim 8, in which the energy storage device comprises at least one of an ultracapacitor, a capacitor, a battery, and a fly wheel.

12. The method of claim 8, in which the second level is based, in part, on a fuel efficiency of the generator.

13. The method of claim 8, in which the third level is chosen, in part, based on a fuel efficiency of the generator.

14. The method of claim 8, further comprising:

routing power between the generator and a power consuming device during a time when an energy capacity of the energy storage device is substantially full.

~~15. The method of claim 14, further comprising dissipating the routed power in a power consumption device of the active power compensation system.~~

~~16. The method of claim 15, in which the step of dissipating the power comprises dissipating the power in at least one of a resistive element, variable resistive element, and a water brake.~~

~~17. The method of claim 8, in which the step of routing power is performed when the power demand of the AC load is higher than a first level.~~

~~18. The method of claim 17, in which the first level is based, in part, on a fuel efficiency of the AC generator.~~