



Powerspan's ECO<sub>2</sub><sup>®</sup> technology is a scrubbing process that uses a proprietary solvent to capture 90% carbon dioxide (CO<sub>2</sub>) from the flue gas. Once the CO<sub>2</sub> is absorbed, the solution containing CO<sub>2</sub> is regenerated through heating to release the captured CO<sub>2</sub>. The product CO<sub>2</sub> is dried and compressed and then is ready for pipeline transport and sequestration.

- 1 Flue gas from a coal-fired boiler passes through the power plant's electrostatic precipitator (ESP) or fabric filter to remove the majority of particulate matter.
- 2 In the lower section, spray nozzles distribute droplets of ammonium sulfate (AS) liquid into the flue gas. Water evaporates from the AS solution, saturating and cooling the flue gas, as well as concentrating the AS co-product. In the upper scrubbing section, sulfur dioxide (SO<sub>2</sub>) is absorbed into the ammoniated solution. The absorber packing enhances the gas to liquid interface.
- 3 Ammonia reagent is added to maintain process chemistry conditions that result in a high SO<sub>2</sub> scrubbing rate.
- 4 Solids in the scrubber bleed stream, consisting of ash and insoluble metal compounds, are removed by filtration. Then the stream is pumped through an activated carbon adsorption bed, which isolates the mercury for separate disposal. The clear, liquid ammonium sulfate stream can be sold in the liquid form or sent to a crystallizer to produce crystals of the required size for sale into the fertilizer market.
- 5 The wet electrostatic precipitator (ESP) captures aerosols, air toxics, and fine particulate matter from the flue gas.
- 6 Scrubbed flue gas, essentially free of SO<sub>2</sub>, oxidized mercury, and particulate matter, exits to the ECO<sub>2</sub> absorber.
- 7 Flue gas enters the ECO<sub>2</sub> absorber, a packed tower. Carbon dioxide (CO<sub>2</sub>) is captured through a regenerative thermal swing absorption process using a proprietary solvent. Flue gas flows up through the tower and is contacted by the CO<sub>2</sub> lean liquor flowing down over the packing. The liquor absorbs the CO<sub>2</sub> so that the exiting flue gas has a much lower CO<sub>2</sub> concentration.
- 8 In the regenerator, steam from the power plant provides the energy required to drive CO<sub>2</sub> out of the solvent circulating between the ECO<sub>2</sub> absorber and regenerator.
- 9 Residual water vapor is removed in the dryer and returned to the ECO<sub>2</sub> absorber.
- 10 CO<sub>2</sub> is compressed and ready for pipeline transportation for geologic storage or enhanced oil recovery operations.
- 11 CO<sub>2</sub> is reduced by 90%. Flue gas with the remaining CO<sub>2</sub> (about 1% concentration) exits to the wet stack.